FOOD MANUFACTURE

Incorporating Food Industries Review

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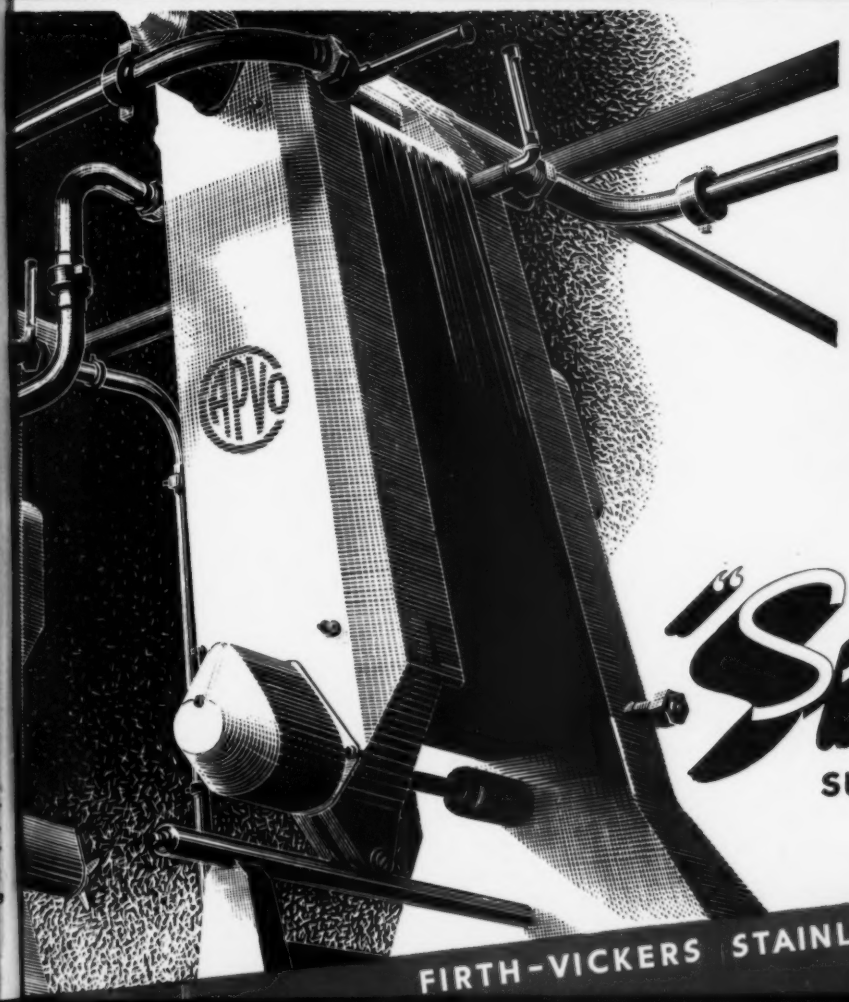

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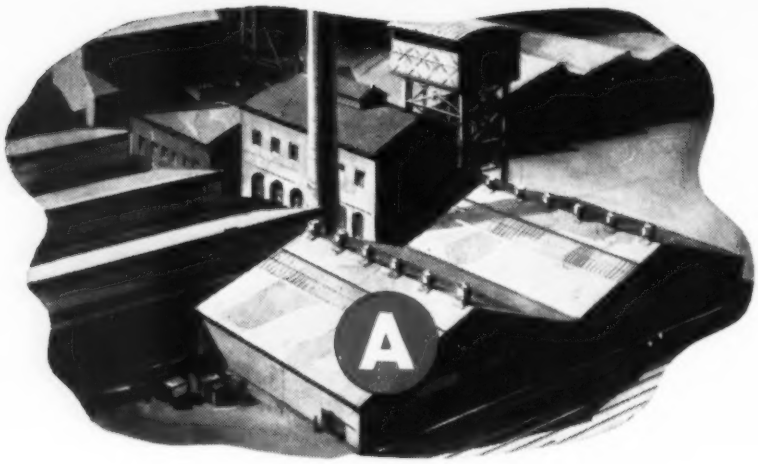

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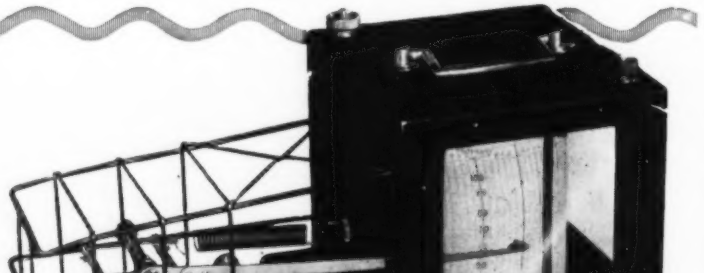

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FOOD MANUFACTURE

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

White, National, or Wholemeal Bread

A PAPER on white, national and wholemeal bread by Dr. J. Douglas Robertson of the Courtauld Institute of Biochemistry, published in *Chemistry and Industry*, 62, **24**, 222, is the latest contribution to this much-discussed subject. Dr. Robertson discusses "the merits and demerits of the three types of bread—white (low extraction), national (85 per cent. extraction) and wholemeal (100 per cent. extraction). In an attempt to choose the best all-round bread, the contest was reduced to sporting principles, whereby white and wholemeal bread first contested the issue, with the winner playing the national loaf in the final". The plain issue—one of shipping space—has been masked by discussion of the national loaf on nutritional grounds, and Dr. Robertson is careful to explain that he does not advocate, at the moment, any bread differing from that governed by the necessity for conserving shipping space.

White and wholemeal breads are compared under the headings of Calories, carbohydrates, proteins, minerals, vitamins and miscellaneous.

Is wholemeal bread, in view of the higher biological value of its proteins, of greater value in a mixed diet than white bread? Dr. Robertson gives a summary of the findings of some investigators on this point, which, briefly, are that the "animal proteins are more useful supplements of white bread than of wholemeal bread, for whereas the biological value of white bread is raised by admixture with other proteins (*e.g.*, milk) that of wholemeal bread fails".

Commenting on McCance and Widdowson's study of brown, dephytinised brown, dephytinised and demineralised brown, and white breads, in which was found a 20 per cent. improvement of calcium absorption from brown to dephytinised brown bread and 11 per cent. improvement from dephytinised to demineralised bread, Dr. Robertson suggests that it might have been due to the removal of magnesium.

Dr. Robertson, having disposed of the contest between white and wholemeal bread in favour of white bread, proceeds to examine the case between white and national bread, and concludes: "It is believed that white flour, fortified with thiamin, riboflavin and nicotinic acid (and also calcium) produces the best all-round loaf."

Determination of Boron

Owing to the importance of boron as a plant nutrient, search has been made for the analytical methods suitable for determining minute quantities. Denis Dickinson (*Analyst*, 68, 805, 106) has recently described a new colorimetric method. For some time synthetic colour standards prepared from alkaline solutions of phenolphthalein and thymolphthalein have been used with fair success by the author, duplicate determinations usually agreeing within 3·5 p.p.m. of boron. Search was made for an alternative method, preferably one more suitable for visual colorimetry. As the turmeric methods appeared unsuitable for rapid routine determinations, experiments with other dyes of the anthraquinone group were made. Feigl finds that purpurine and alizarin-S were less sensitive than quinalizarin as reagents for boron. However, in the experience of the author, alizarin-S, although giving colour change less definite than that with quinalizarin, was not necessarily less sensitive. In fact, when boric acid and alizarin-S react in concentrated sulphuric acid solution the colour of the dyes is only intensified, and remains substantially the same as that of methyl-orange in aqueous alcohol; this observation suggested the possibility of using artificial colour standards.

In his conclusions the author states that the alizarin-S method, used in conjunction with the ashing procedure (which is described), gives results which are correct to within 2 p.p.m. when 0·5 gm. samples are used—*i.e.*, within 0·2 μgm. of boron. Moreover, the colour can be matched much more easily than the violet quinalizarin colour, and this factor alone reduces considerably the time required for the completion of a series of determinations.

The Training of Physicists

As time goes on we are hearing a great deal about the training of scientists. That the movement proceeds is evidenced by a report recently issued by the Board of the Institute of Physicists on the education and training of physicists, recently issued by the Board of the Institute of Physics, prepared for it by a strong committee under the chairmanship of Sir Lawrence Bragg.

The main object of the report is to outline proposals which will ensure to intending physicists an education which will enable them to make their fullest contribution to the service of the community.

The present scholarship system is criticised and its replacement by a modified system of State bursaries is recommended. Undue specialisation is undesirable, and a general course of science is recommended as a prelude to an intensive study of physics.

The study of English and foreign languages is considered to be an important part of the physicist's equipment. The report stresses the important functions of the technical colleges in an industrial society which, it maintains, must be kept distinct from those of the universities. The committee hopes that, by the adoption of a State Bursary Scheme, which would ensure to all those who show sufficient ability (irrespective of the private means available to them) a full-time university education, the technical colleges would be able to concentrate on their special activities by relieving them of the necessity for preparing students for external university degrees. It is recommended that technical colleges should provide courses in branches of technical physics on the lines of those for National Certificates and Diplomas and that students who take these should be enabled to obtain some recognised professional qualification in physics. The committee also considers that students should have direct contact with industry as part of their training.

Ice Cream Substitutes

Substitutes for ice cream are springing up with the rapidity of mushrooms in all parts of the country. Perhaps we should use the word "alternatives" instead of "substitutes" as wartime Orders and Regulations have given a special legal significance to the latter word.

A high official of the Ministry of Food stated recently at a Press Conference that the Department had no intention of modifying the Prohibition Order so as to permit the manufacture of ice cream for consumption on the premises. This refusal is regarded by the industry as an indication that ice cream will be prohibited for the duration of hostilities.

Leaders of the trade associations believe that if some of the products now appearing on the market are not withdrawn prosecutions may follow. Inquiries at one of the divisional offices of the Ministry of Food indicate that no specific instructions have been issued to inspectors in regard to the matter; nevertheless, inspectors have in many instances informed ice cream manufacturers that if they do not cease production of their present substitutes summonses will be issued.

Unfortunately, there is little uniformity in the action taken by the inspectors. In one instance near London contrary instructions have been given to the same trader by different inspectors. Most of the products on the market are blancmanges or custards of varied types. The argument put forward is that these products do not become ice cream if served below a certain temperature. If they did, large quantities of blancmange and custard might become illegal products when stored overnight in catering establishments in order to keep them in condition for use the following day. Air is an essential ingredient in ice cream, and manufacturers claim that a blancmange or a cus-

tard cannot possibly be described as a substitute for ice cream if it has not been whipped so as to incorporate air.

It does not necessarily follow that a frozen product that contains air is either ice cream or a substitute for it, though the position is complicated by the fact that there is no legal definition of ice cream. A frozen product has appeared on sale in Glasgow containing 20 per cent. potato, the presence of which is camouflaged so as to give a product that tastes somewhat like lemon curd. It has been sold in cones and in wafer sandwiches and has had a brisk sale. Manufacturers have frequently offered to submit samples to the Ministry, but so far no action seems to have been taken.

The best effort to obtain some sort of ice cream was made by some American airmen, who adopted a delightfully "illegal" method. They obtained eggs and milk from local farmers, added sugar and flavouring, made a custard mix, and put it in a "tin hat". This they wedged in the tail of their bomber. The high altitudes at which they flew did the work of a freezer, and on landing they had a hat full of ice cream!

Post-War Milk Plans

Details are expected to be published this month of an ambitious post-war scheme for the reconstruction of the whole of the milk industry. The scheme has been drafted by leading representatives of the milk distributive trade and is being considered by the trade organisations, including milk manufacturers, before being presented to the Government Departments concerned and released for publication.

The scheme provides for the control of all three sections of the industry (production, distribution and manufacture) after the Ministry of Food has ceased to function. We understand that its main provisions are that the Milk Marketing Board should be responsible for the control of milk production; that a Distributors' and Manufacturers' Board should supervise liquid milk distribution and milk manufacture; and that a Central Board or Committee should be responsible for fixing prices and acting in a co-ordinating capacity between the Producers' and the Distributors' Boards.

It is reasonable to assume that after the winding-up of the Ministry of Food an Exchequer subsidy will continue to be payable under the national and school milk schemes, as these are intended to be of a permanent character. It is also hoped that post-war imports of milk products will not operate to the detriment of our own creameries and milk producers. The Central Board or Committee, it is suggested, should therefore include representatives of the Government Departments concerned with milk and milk products, and a small limited number of representatives of each of the other Boards.

Another feature of the scheme is that the Producers' and Distributors' Boards should have equal statutory powers. This brings us back to the position envisaged by the Grigg Commission but never put into operation. It also recalls the recommendations of the Perry Report in regard to a distributive organisation "equipped with all necessary powers".

Some objection to the scheme may be expected from the Milk Marketing Board, which, under such a scheme, would have less authority than before the war. The scheme would probably put an end for all time to the Milk Products Marketing Scheme, which is still in abeyance. Any post-war scheme along the lines indicated would require legislation before it could be put into operation. Whether this scheme be accepted or not, it is clear that the Ministry of Food will, before its demise, make proper provision for the future of the milk industry.

Some Derivatives of Lactic Acid

A paper read by Earle O. Whittier, of the Division of Dairy Research Laboratories, Bureau of Dairy Industry, Agricultural Research Administration, U.S. Department of Agriculture, before the Division of Agricultural and Food Chemistry of the American Chemical Society at Detroit, Mich., U.S.A., is of considerable interest, sufficiently so to gain for its author the Border Award in the Chemistry of Milk. The following is a short abstract of the paper.

Lactic acid, having an alpha-hydroxyl group in addition to its carboxyl group, is bifunctional and capable of forming several series of compounds.

Dehydration of lactic acid results in linear polyesters, which, as their molecules increase in size, become viscous resins. These resins are the basis of lacquer coatings characterised by their resistance to acids and steam, their adhesive properties, and their elasticity.

Lactide, which may be made by the dehydration of dimeric lactic acid, has been shown by Bezzi *et al.* to be less resistant to hydrolysis than the dimeric acid. Furthermore, the greater the length of the linear polyesters, the greater their resistance to hydrolysis, as Bezzi has shown by determination of the constants and mechanism of their hydrolysis. Carrother's hypothesis of reversible transformation of linear polyesters to lactide has been shown by Bezzi to be untenable.

Actylated lactic acid esters may be pyrolysed to give the corresponding acrylates, which polymerise to flexible, transparent, colourless materials of industrial interest.

The esters and ethers of lactic acid are unusually versatile solvents. The polyactylic esters and ethers should be more desirable than the simple esters because of greater resistance to hydrolysis.

What is a Cordial ?

The sale of a liquid as a "cordial" has given rise to an important decision under the Food and Drugs Act. The case in question is Collins Arden Products, Ltd., *v.* Barking Corporation, and the effect of the decision has already been the subject of questions in Parliament.

The manufacturers of a beverage had described it on the label as "Orange Citric Flavoured Cordial"; before selling it they had submitted samples of the beverage and copies of the label to the public analyst of certain boroughs, but not including Barking. The analyst gave his approval. On analysis, the liquid was found to consist of "a solution of citric acid flavoured with orange oil, coloured with a dye and sweetened with saccharin", and contained no alcohol or sugar. It was contended by the Corporation that the liquid was not a cordial and that accordingly offences had been committed under S. 3 (1) and S. 6 (1) of the Food and Drugs Act. The question was: What was meant by the word cordial?

For the Corporation evidence was given that "cordial" was a word originally used to denote an alcoholic liquid having a "heartening or restorative effect", but that in more recent times it was used to describe a flavoured syrup having a physiological effect, which might be described as "heartening" by reason of the presence of a large percentage of sugar, and that no product could be called a cordial if it did not contain either alcohol or sugar or both. For the manufacturers, evidence was given that what was understood by cordial was merely "any pleasant beverage, sweetened or unsweetened, flavoured and needing dilution".

The justices found that the preparation in question was a palatable and harmless beverage, but that it contained no ingredient which could give it a "tonic, invigorating, energising or warming quality", and that therefore it was not a cordial and that offences had been committed under the provisions of the Food and Drugs Act.

The Divisional Court, on appeal, however, differed from the justices. In their opinion, it was essential to show that when the ordinary person went into a shop and asked for cordial, he meant only a liquid containing either alcohol or sugar or some other substance which would give it a heartening or restorative effect. That had not been proved, and therefore no offence had been committed.

The effect of this important decision is that, in the present state of the law, when a person asks for a cordial he is not to be supposed to mean that he wants something with a tonic or heartening effect and containing sugar or alcohol or some other substance which will produce such a result, and if he is supplied with a beverage which is of a pleasant and flavoured nature and needing dilution he has no cause to complain.

Abortus Fever

Still another argument for milk pasteurisation is contained in a recent letter to the *B.M.J.*, signed by Dr. Alasdair McI. Smith, who says:

"The recent references to abortus fever have particularly interested me as I have within the last six months had two cases of *Br. abortus* infection in my private practice. The incidence of abortus fever, as Dr. J. Landess Horne remarks, is not only probably much higher than is generally believed but—and here is the important point—is almost certain to increase as a result of the policy of the Ministry of Agriculture of vaccinating non-pregnant cattle with living cultures of *Br. abortus*. Cattle so treated are given increased protection against the risk of abortion although at the same time their milk is rendered more dangerous for human consumption in the raw state. Apparently the Ministry of Agriculture is only concerned with the quantity and not with the quality of the milk produced, the latter being the concern of the Ministry of Food.

"That this anomalous position should exist is an example of departmentalism at its worst. The policy of the Ministry of Agriculture can be justified *only* by the Ministry of Food coming promptly into line and introducing compulsory pasteurisation."

A Chemical Dinner

On our lawful occasions in the past few years we have assisted at repasts composed of (at the time) novelties such as quick-frozen foods and, latterly, dehydrated foods, with profit to our digestion and pleasure to our palate. A still more revolutionary feast has just been given in Switzerland. A complete meal derived from wood—soup, meat and dessert—was served to ten specially invited guests. The piquancy of the synthetic meat was enhanced by "a pleasantly pungent synthetic sauce prepared from the same raw material." These preliminary experiments on the utilisation of wood as a basic substance of human food are said to have been made in the Jean Mayer Laboratory at Lausanne. The cost of the food is said to be much lower than if the equivalents in natural food had been served. A somewhat cryptic claim is made that "flavour makes it impossible to recognise chemical food from natural food."

We have always been among those who put no limit to future scientific achievement, but confess to being a little shaken in our faith about the flavour. In the days of our youth "lewd fellows of the baser sort" used to give the counsel, "never prophesy unless you know." Maybe opportunity will occur to assist at a "wooden" banquet (not, we hope, by reason of famine but for the glorification of dietetic research), and then, like Sam Johnson, we shall be enabled to "eat exceedingly and prophesy."

The Food Conference at Hot Springs

The meeting of representatives comprising 80 per cent. of the world's population and their agreement on a common policy is in itself an event of importance. Whether it deserves the epithet of "epoch-making", which was given by President Roosevelt to the United Nations Conference on Food and Agriculture at Hot Springs, Virginia, would seem to depend to no slight degree on the significance of the "common policy" upon which agreement has been reached.

SPECIALLY CONTRIBUTED

HAS THE Hot Springs Conference come to any *significant* conclusions? Has it shown the way along which enlightened principles and generous impulses can be brought to practical fruition? "A world free from want is not to be had for the wishing", as *The Times* put it. Has the Conference produced anything more tangible than an agreement on the desirability of a world free from want?

Planning an International Organisation

The main practical result is a recommendation to form an interim commission charged to plan a Permanent International Organisation for Food and Agriculture. It appears that this commission will be set up not later than July 15, and that its headquarters will be at Washington. President Roosevelt has pledged the full support of the United States.

This is no mean achievement. To what extent the new organisation would overlap with, or take over the work hitherto carried on by, the International Institute of Agriculture at Rome is not yet clear. But there is little doubt that an immense field of useful work lies before such an international body, even if it be only fact-finding, statistics, research and publicity. The tremendous advance in scientific knowledge on nutritional problems may be utilised on an international scale.

Information and knowledge, however—indispensable as they are—remain sterile unless they are brought to practical application. The Conference has made the bold statement that the majority of mankind suffers from malnutrition—the majority even of the populations of so-called advanced countries. The statement is undoubtedly true; these facts have been known for a long time. But what is going to be done about it?

Causes of Malnutrition

The report of the Conference gives the causes of this state of affairs:

1. Insufficient purchasing power.
2. Inadequate supplies of satisfactory foodstuffs at reasonable prices.
3. Ignorance among the public and administrators on nutritional problems.

It may not be unreasonable to hope that an International Authority such as is going to be set up as an outcome of the Conference will be able to overcome cause (3)—straightforward ignorance. But what can it do to overcome the other two causes: the lack of purchasing power and the lack of supplies? This is the crucial question.

Let us try to view this question in the right perspective. It is well known that the world as a whole does not produce enough food to secure freedom from want for everybody. But this is a mere statistical point. A far more important fact is that the world has suffered during most of the inter-war years from agricultural *surpluses;* from an inability to sell to the hungry all the food it produced. It does not do us much good to reiterate to ourselves the truism that all human needs, of agricultural as well as of industrial goods, have not been satisfied in the past and may not be satisfied in the future because of a sheer lack of productive resources. It is almost a mockery to call for increased production in peacetime, when the *existing* production cannot be fully utilised for the well-being of man. Thus the problem of "effective demand", the problem of purchasing power, is the primary one, and the problem of production a secondary one. In some backward areas the shortage of foodstuffs may indeed be due to a simple lack of supply, arising out of the lack of knowledge regarding modern methods of pro-

Mr. R. K. Law, Under-Secretary for Foreign Affairs, Chairman of the British delegation to the United Nations Conference.

Photo: Elliott and Fry, Ltd.

duction. But this is a rather special case, deserving, to be sure, of close attention. The general case is that countries, poor and rich alike, suffer, not so much from a physical shortage of food supplies, but from an inability of marketing all the supplies that could be made available. Before there is much point in tackling the problem of production, there is the necessity of tackling the problem of " effective demand "—the problem of how to get all available and potential supplies to the consumer.

Restriction of Output

The agricultural producer does not suffer from any strange perversion in his sense of values. When he restricts his output, he does so in order to maintain agricultural prices at a level which will enable him to live and to pay his debts. It is useless to tell him that he should follow an expansionist, instead of a restrictive, policy, unless he can be given the assurance that his output will be purchased at an acceptable price.

What applies to individual producers also applies to producer countries. It is of no use exhorting a country with agricultural surpluses to increase such surpluses or to abstain from restrictive measures, unless it can be assured of a market for them. All this is common sense and well known. But it is worth emphasising, in order to get the right perspective of the problem. The fundamental issue is whether or not there will be a sufficiency of effective demand to allow all the goods produced by man, the producer, to reach man, the consumer.

The Conference's Approach

What has the Food Conference done to bring this problem nearer to solution?

The report says that minimum-wage regulations, family allowances, health insurance, old age pensions, and unemployment insurance are indispensable but insufficient when adopted alone. Cash payments to the unemployed or aged, it adds, should be large enough to provide for adequate diets. This is well said. *Are* they going to be large enough? Are such schemes to be introduced in all countries?

Thus we are thrown back upon questions not immediately connected with food and food alone: to the general economic problems confronting our society. The Beveridge Report, if carried into practice, would do more for nutrition and agriculture than all the recommendations of the Food Conference put together. If the delegates at Hot Springs had been able to state that their governments were going to introduce " Beveridge " in their respective countries, the outcome of the Conference would deserve the epithet of " epoch-making ".

But this alone would not have been enough. A full nutritional programme in the countries which before the war had an agricultural surplus would not absorb the total of these surpluses and would leave the problem of the " deficit " countries unsolved. Apart from internal schemes to assure freedom from want at home, there must be an international scheme to enable countries in need to import.

Expansion—not Restriction—of Production

The Conference reached easy agreement on the general proposition that the guiding principle of all food producers should be expansion instead of restriction. But how is the agricultural surplus of (say) Australia to be utilised? The answer is obvious: it is to be exported to countries which need it. But how are such countries to pay for their imports? This question, it seems, has been carefully avoided. And, yet, it is the decisive question. The Conference recommends the abolition of trade barriers against agricultural imports and gives the " fear of aggression " as the cause of trade barriers. But this explanation is utterly insufficient. The most cursory review of agricultural protection shows that the fear of aggression has played only a very small part in its development.

It is often convenient to give political explanations for economic phenomena. To give the economic explanation might raise unwelcome problems. But this attitude is not very helpful. There are many causes for agricultural protection, and the most important one from the point of view of our discussion is the lack of exports to pay for agricultural imports. How is this to be overcome? How is Britain, for instance, going to pay for increasing imports of foodstuffs, when her exports may fail to expand sufficiently? If the full productive power of the farmers in the New World is to be released by a programme of agricultural expansion, how are the resulting agricultural surpluses to be paid for by the Old World? The Conference has adopted the slogan: Expansion instead of Restriction —a good slogan, indeed. But it is silent on the fundamental question of how the resulting output is to be paid for by the countries that wish, and ought, to import.

Fundamental Problems

Thus, again, we are thrown back upon the wider and more fundamental problems. We must have policies to be applied *within* countries which assure that all persons in need have enough purchasing power to cover their needs. And we must have policies to be applied internationally which assure that all countries in need have enough international purchasing power to cover their needs. The prerequisites of a constructive food policy are, internally, something like the Beveridge scheme and, internationally, something like the Keynes Plan (with suitable provision for international lending).

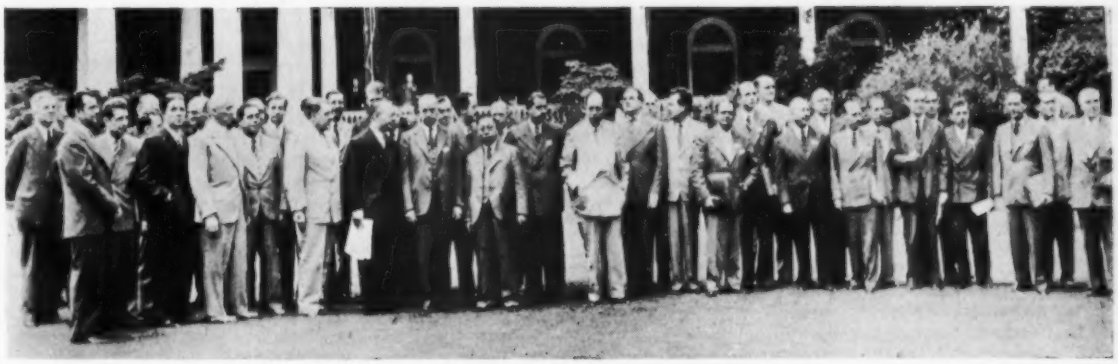
If instead of repeating the old *cliché* of " reduction of barriers of every kind of international trade " the Conference had recommended the adoption of a scheme whereby importing countries could be assured of possessing the means of payment for imports, it would have done justice to the problem under discussion. But this would probably have been regarded as outside its terms of reference.

Utilisation of Productive Capacities

Food, to be sure, is the most basic of human needs. Food production, therefore, may be considered the most basic of human activities. It is not, however, the most pressing of human problems. The most pressing problem is how to bring about the full utilisation of productive capacities already existing. Measured against human needs, we still live in the Age of Scarcity. But measured against " effective demand ", we live (except during war) in the Age of Plenty. The Food Conference was concerned neither with problems of war supplies nor with problems of immediate post-war relief. It

English group arriving at Hot Springs. Left to right: Richard K. Law, chairman of the British delegation; R. R. Enfield, British delegate; Frank L. Engledow, assistant and adviser to the British group.

Chairmen of the delegations from 45 nations at the first meeting of the Executive Committee of the United Nations Conference.



A general group of the representatives participating in the Conference.

was concerned with the problems of a peacetime world economy. But it treated these problems as if they were primarily problems of production; it persuaded itself, by pointing at unsatisfied human needs, that the greatest need was for increased output. Thus it missed the point, or, to put it more mildly, it put the cart before the horse.

Without a world-wide policy of putting purchasing power into the hands of the underfed, agricultural surpluses will be unsaleable and larger agricultural surpluses will be even more unsaleable. Without a mechanism of international exchange and credit, agricultural exports will be unsaleable; agricultural imports by countries without the means to pay for them will be restricted; and the larger the unsaleable surpluses the sooner is the world going to get back to the atrocious practice of food destruction. The problem can be solved by liberating human demand and making it effective. Once that has been achieved, the problem of production becomes pressing, but not before.

Let the People Spend

How can it be achieved? The answer—on which there is now almost complete agreement amongst students of economic affairs—can be summed up in the formula: " Let the people spend ". It is an evil if they spend too much; the evil is called Inflation. But it is an equally great evil if they spend too little; the evil is called unemployment and " over-production ". Whether the people do the spending themselves, or whether they let their governments do it for them, is a matter of secondary importance. The main thing is that the total rate of current spending is maintained at such a level that all productive resources are kept in employment. For, after all, " spending " and " earning "—for the world as a whole—are merely the two facets of the same thing.

There is also pretty general agreement that it is the task of governments to see to it that the total rate of spending is neither deficient nor excessive and to secure a high steady level of National Income, Employment, and Consumption by a correct spending policy of their own. Such a spending policy may be, and is likely to be, accompanied by budget deficits.

Budget Deficits

Here, again, there is far-reaching agreement: budget deficits are not, in themselves, unsound, as long as they merely serve to maintain maximum (or optimum) economic activity. A National Debt, internally held, is sometimes inconvenient but no real burden to the community as a whole. But now we come to a point of disagreement, a point of the greatest significance for the subject here under review: there is one school of thought which, while not objecting to budget deficits (and a rising National Debt) *as such,* insists that the deficit should be spent on durable goods, like roads, hospitals, houses, armaments, or foreign investments; another school of thought maintains that it should be spent on whatever the community needs most: on roads, when roads are urgently required; on houses, when it is houses that the people need most; on food, if the people are underfed.

The Food Conference has unanimously declared that food is the most basic of all necessities; squalor and ignorance are great evils but hunger is perhaps the worst. Thus the problem on what a government may spend its deficit is a very important one? Should it build houses as long as people are hungry? Should it try to educate those who are too underfed to have the strength to learn? If possible, of course, it should do all these things at the same time. But, then, our productive resources are limited. Because they are limited, there must be a priority list for government expenditure, and on this priority list, it would seem, food for the underfed should take the very first place.

The Vital Question

This, then, is the vital question: Is " food for the needy " going to be Number 1 on the priority list according to which governments in peacetime are going to plan their expenditure? Is there going to be a priority list at all? Are we in earnest about " Freedom from Want "?

Will governments be allowed to incur budget deficits for the purpose of raising the food consumption of the underfed? Or are they going to be tied to directing their additional spending into " public works " or what the economist calls " investment "?

If they will be free to subsidise food consumption in one form or another—there is little doubt that we shall get an expanding world agriculture. Then the recommendations of the Food Conference, dealing mainly with methods for the expansion of production, may prove of the highest value. If, in addition, agreement is reached on an international plan for enabling food importing countries to pay in goods for the goods they take, mankind in all countries may finally emancipate itself from the age-old curse of hunger and malnutrition.

Some Thorny Problems

The Food Conference at Hot Springs had an easy passage because it did not deal with these fundamental issues. The delegates did not attempt to reach agreement on such thorny problems as, for instance:

- Is it sound for governments to incur budget deficits for the purpose of maintaining a steady high level of economic activity?
- Is it sound for governments to spend such deficits on subsidising consumption?
- How is a food-importing country, which raises the internal demand for foodstuffs, going to pay for its additional imports?
- Should international credits be given to a country that does not need credits because of industrialisation, etc., but simply because it is enabling its citizens to consume a proper diet?
- If this is not a matter for international credits, how can the food exporting countries be induced to accept manufactured goods as payment for their deliveries of food?

These and many other relevant questions might have been, but, from all accounts, were not, discussed. The Conference preferred to deal with technical and scientific problems. And the practical result of the Conference is the establishment of an international body with mainly technical and scientific functions. This body may do a lot of useful work. But it will not solve the problem of " Poverty in the midst of Plenty ". It may increase " Plenty " without diminishing " Poverty ".

Freedom from want will not be ensured unless the *economic* problems of our society are squarely faced.

Fruit Preservation by Sulphur Dioxide

Part I

SPECIALLY CONTRIBUTED

SULPHUR dioxide has outstanding advantages as a preservative for fruit products and its employment in this connexion is very extensive. This applies particularly to jam fruits, the preservation of a proportion of the crop enabling jam boiling to be carried on over the whole of the year.

Although no proof has been forthcoming that sulphur dioxide or its salts are without harmful effect on health, their presence in small amounts is sanctioned by the custom of many years. There is certainly insufficient evidence to prove them injurious.

The maximum amounts permitted in Great Britain vary from 3,000 parts per million in preserved cherries to 40 parts per million in jams, marmalade and fruit jelly. Foods in which a large amount of the preservative is tolerated are, in general, those which lose a considerable proportion of sulphur dioxide during cooking.

Properties of Sulphur Dioxide

Moderate cold or pressure liquefy the gas and it is in the liquid form that it is sold, either in cylinders or siphons. It readily dissolves in water, giving a strongly acid solution containing sulphurous acid, which combines with soda, potash and lime to form fairly stable soluble salts, the sulphites and bisulphites. Aqueous solutions of sulphurous acid are completely freed from sulphur dioxide by boiling. This loss by volatilisation occurs also at lower temperatures but at a much reduced rate. Loss of sulphur dioxide from solutions of sulphites and sulphurous acid when exposed to the atmosphere occurs in another manner—by combination with oxygen from the air to form sulphuric acid.

This property of sulphur dioxide of combining with any oxygen in its vicinity is the basis of the retarding action it exerts on the oxidative deterioration of substances preserved with it.

An interesting property of sulphurous acid is its ability to combine with the members of two groups of organic substances, the aldehydes and the ketones. These groups include most of the naturally-occurring sugars and the reaction consequently occurs when fruit, etc., are preserved with sulphur dioxide. Sulphur dioxide which is combined with sugar in this way is less reactive than when uncombined and is said to be " fixed ", to distinguish it from normal " free " sulphur dioxide. In the fixed condition it is less readily volatilised and less effective as a preservative.

The amounts of preservatives permitted in a variety of fruit and allied products are given in Table 1. For information concerning other parts of the world reference should be made to the specialised literature.[1]

One advantage of sulphur dioxide has already been referred to. The volatilisation of a large part during cooking is a property which enables raw material, treated with a comparatively heavy dose of preservative, to be used for the preparation of a finished product with a much smaller content. Another important property is the retarding action exerted on oxidative changes such as the destruction of vitamin C and colour deterioration. A disadvantage is the noticeable taste associated with quantities necessary to give effective preservative action in the absence of other favourable circumstances such as high acidity or sugar content. That this taste is not objected to by the general public is proved by the wide acceptance of, for instance, fruit squashes in which the presence of sulphur dioxide is quite evident to the trained palate.

Methods of Using Sulphur Dioxide

Sulphur dioxide is used as a gas (*e.g.*, for the preservation of dried fruits); as a solution in water; and combined with sodium, potassium or calcium. A solution in water, containing 6 per cent. sulphur dioxide, may be bought ready prepared, or it may be made for immediate consumption by bubbling sulphur dioxide gas into water. The gas for this purpose is usually derived from liquid sulphur dioxide in cylinders. An alternative for large users is to burn sulphur.[2]

If liquid sulphur dioxide in cylinders is to be used, plant requirements are extremely simple, it being sufficient to connect the source of gas to a bubbler dipping into a barrel of water by means of a copper tube. The flow of gas is adjusted by a valve attached to the cylinder and the progress of the operation may be followed by measuring the specific gravity of the solution. This is related to the percentage of sulphur dioxide as shown in Table 2.

TABLE 1.

PERMITTED PRESERVATIVES IN FRUIT AND ALLIED PRODUCTS (U.K.).

	Parts per Million.	
	Sulphur Dioxide.	*Benzoic Acid.*
Fruit and fruit pulp :		
Cherries	3,000	—
Strawberries and raspberries ...	2,000	—
Other fruit	1,500	—
Dried fruit :		
Apricots, peaches, nectarines, apples and pears	2,000	—
Raisins and sultanas	750	—
Jam, marmalade and fruit jelly ...	40	—
Crystallised, glacé, or cured fruit and candied peel	100	—
Fruit and fruit pulp not otherwise specified	350	—
Non-alcoholic wines, cordials and fruit juices	350 or 600	—
Beer	70	—
Cider	200	—
Alcoholic wines	450	—
Sweetened mineral waters ...	70 or 120	—
Brewed ginger beer...	—	120

TABLE 2.

SPECIFIC GRAVITY OF SULPHUROUS ACID SOLUTIONS.

Specific Gravity.	*Sulphur Dioxide. (Per Cent.)*
1·005	1
1·010	2
1·015	3
1·020	4
1·025	5
1·030	6

If it is desired to prepare a solution containing a proportion of calcium this is simply effected by adding a volume of the 6 per cent. sulphur dioxide solution to a weighed quantity of calcium carbonate, preferably in the form of bolted whiting. The calcium carbonate used should of course be substantially free from objectionable heavy metals.

A Sulphur Burning Installation

A plant for burning sulphur for the preparation of sulphurous acid has recently been described in some detail.[2] This particular installation produces 1,000 gallons of 1 per cent. acid every 3 hours, with presumably a smaller output of stronger acid. The sulphur is burned in a stove and the gas evolved is drawn firstly through a lead cooler and then up a wooden scrubbing tower 2 ft. × 2 ft. × 18 ft. packed with 1-in. coke. Water fed into the top of the tower flows out into a 1,000-gallon tank after absorbing the sulphur dioxide. The plant is operated for the treatment of cherries and soft fruits in British Columbia and has resulted in a reduction of preservative cost per barrel of cherries from 43 cents. when liquid sulphur dioxide in cylinders was used to 6 cents. when the sulphur burner is operated.

Salts of sulphur dioxide, or, more correctly, sulphurous acid, are obtainable in the solid form and their preservative effect is approximately proportional to their content of sulphur dioxide, although the presence of potassium, sodium or calcium may have important effects on the material to be preserved.

Fruit Pulp for Jam

The following is a general description of the processing of fruit pulp as carried out in the Portadown factory of Robert Wilson and Sons (Barrhead), Ltd.

"The fruit, on arrival at the plant, should be stored in comparatively small containers—storage in large units will promote heating and fermentation and reduce the pectin content. All fruits, except apples, should be handled within 24 hours of receipt.

The first operation in pulping is to pass the fruit over a belt conveyor so that all excessively damaged fruit may be removed, as this type of material has a bearing on the colour of the finished pulp. The fruit is then passed under heavy water sprays or through a rotary washer to remove all traces of arsenic or nicotine sprays which are employed in most orchards for the prevention of various diseases.

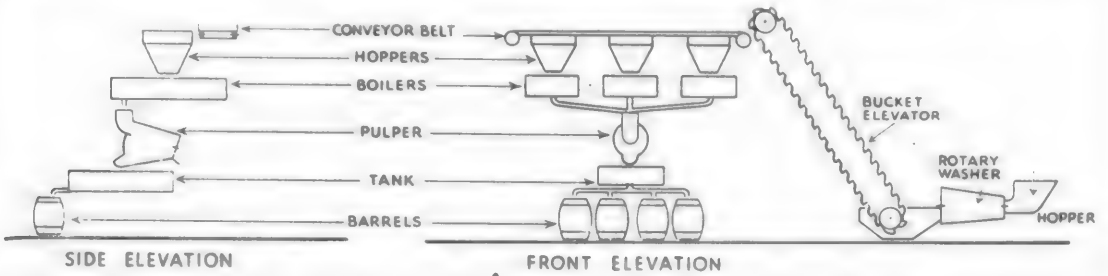
At this plant, after emerging from the washer, the fruit automatically enters a bucket conveyor which takes it to the second storey of the pulp house, emptying it into hoppers placed above copper-lined boiling vessels, which are capable of holding approximately 15 cwts. of fruit. The reason for having the hoppers is in order to permit the quick loading of a charge after a boiling pan has been emptied.

The boiling pans, which are fitted with open steam coils, also have lids to which a steam extraction system is attached. When the fruit has been emptied from the hopper into the pan a certain amount of water is added. Here care must be taken, as the Ministry of Food only permits the addition of a certain percentage of added moisture to fruit pulps and, consequently, when using open-steam boiling pans the amount of condensation which occurs during cooking must also be taken into consideration and it is that which determines the amount of moisture to be added at the initial stage.

The lids are placed on the pans and the fruit slowly brought to the boil, when it is allowed to simmer until it becomes soft. The time naturally varies according to the type of fruit being processed, but in the case of apples this process usually occupies 25 to 30 minutes.

When the fruit has been sufficiently softened, the permitted amount of sulphur dioxide solution is added and the pulp stirred with a mechanical agitator. In the case of apples, the solution used at this plant is 3 pints per cwt. of 6·25 per cent. sulphur dioxide, which gives the allowed percentage of 1,500 parts per million in the finished pulp. This solution is made from meta-bisulphite powder containing 62½ per cent. sulphur dioxide.

The pulp is next allowed to flow out of the pan through a chute in the floor into a pulping machine, which not only removes undesirable portions of fruit, but ensures a thorough mixing of the sulphur dioxide with the pulp. This machine runs the pulp into a wooden tank mounted on piers approximately 3 ft. from the ground, where it is allowed to run by gravity through stainless steel taps into barrels which have



A diagrammatic illustration of the plant used for fruit preservation by sulphur dioxide at the Portadown factory of Robert Wilson and Sons (Barrhead), Ltd.

first been steamed to remove any foreign matter. The barrels are then put into storage and are ready for despatch.

When processing fruits such as damsons, plums, etc., from which the processor does not wish to remove the stones, or blackcurrants and gooseberries which it may be desirable to leave whole, it is only necessary to remove certain parts from the pulping machine so that it is merely used as a conveyor of the fruit from the boiling pans to the filling tanks.

It is possible to process certain soft fruits by the cold method. In this case the barrels are not filled completely with fruit before adding the preserving solution. A small quantity of fruit is first put in, sulphur dioxide solution poured in, then more fruit and more solution and so on until the barrel is full.

Owing to the volatility of sulphur dioxide, only very sound casks which have been well coopered should be used. Even when this precaution is taken, it is a good practice to take periodical samples of the pulp being stored, in order to ensure that the sulphur dioxide content is being maintained; if not, further additions should be made."

"Fruit Preservation by Sulphur Dioxide" will be continued in a forthcoming issue. Publication of the complete list of references will be given in the concluding instalment.

Double Seaming Leaks in Cans

J. R. BURRELL

AT THE end of a six months period of testing cans for double seaming leaks it was found that a proportion of cans leaked when these were filled with water, leaving adequate headspace, and then immersed in an oil bath (kept at 240° F.) until a pressure of between 15 and 20 lbs. had developed internally. More than 1,000 cans (mainly A.2½'s and A.1 talls) were tested and the leaks in about 75 per cent. of cases were by the junction of the lockseam with the double seam.

The seams were removed in order to examine the can and lid hooks, the position of the leak being marked before the seams were cut from the cans. It was found that leaks other than those at the junction of top and side seams were caused by wrinkling and short can or lid hooks. Short hooks were also found to greatly increase the possibility of these junction leaks.

From these results it appeared that commercial double seaming did not necessarily mean complete hermetic sealing. However, it was found that the majority of the leaks were very minute and that a small amount of solid matter—detached pieces of rubber sealing compound or material from the contents of cans in actual production—sealed the small leaks by packing down into the gaps in a similar way to that in which starch packs into a Gooch crucible under suction and so prevents further filtration or washing.

Leaks Caused Through Over-Filling

It was found that cans could be made to leak badly by overfilling. This was through no fault of the seaming but was caused by excessive pressure following upon inclusion of large amounts of air and consequent piling up of solid material above the rim (in order to get correct filling weight), this protruding material getting caught between the can and lid flanges during clinching, producing hermetic sealing and making subsequent exhausting an impossibility. This type of overfilled can would be distended after exhausting, and following upon retorting would be either a puffy can or a leaker, owing to excessive pressure having forced some of the can's contents through the double seaming, this material emerging usually in the form of a clear, gluey, filtered liquid.

This overfilling by volume is most easily demonstrated in fish and meat pastes, for, if air is purposely included by rough hand-filling, the can, although only being of the normal weight, will be either puffy or both puffy and leaky.

If the cans are properly filled by an extruding machine this does not happen as air is not included in this case.

Valve Effect

If cans are filled to the usual extent with water, closed, and retorted at various pressures there is found a proportion that show a vacuum on cooling, even when conditions of temperature, external and internal, are strictly controlled. A percentage can perhaps be accounted for by the stretching of the can by the internal pressure developed during processing, but there is still a residue in which the vacuum is definitely not caused in this manner.

In view of the wide evidence of minute leaks in commercial seaming, there can be little doubt that the vacuum is produced by a valve effect in which a small quantity of air and steam is blown out of minute leaks during retorting before chance pieces of liner or dust finally fill the gaps and so produce complete hermetic sealing and a partial vacuum on cooling.

Incidental Blowing

In the case of the occasional blown can the valve effect is reversed and the causative leaks are usually larger. The causative organism has gained access during cooling. That is to say, it has been sucked into the can by the internal vacuum during cooling before the leak becomes sealed by less imponderable pieces of matter drawn from the seaming. That the bacteria gain access in cases of this type is shown by the fact that the great majority of incidental blown cans—the occasional one or two per factory batch—are found to contain non-sporing bacilli, and cocci with low thermal death point.

If, after testing cans for leaks in the heated liquid paraffin bath, they can be rapidly transferred to a cold-water suspension of ground rice or similar material, the leakers, on cooling, will be found to have developed

a vacuum. In cases where there are fairly large leaks and the cans have been allowed to stay in the oil bath for 15 minutes or more, a very high vacuum can be demonstrated. By keeping the time factor constant a useful corroborative test for leaky seams is evolved. In order to correlate all data, *i.e.*, bacteriological findings, oil bath and rice suspension results, with the double seaming irregularities, it is advisable to cut through the double seaming at one point and after filing away the top edge of the double seam to remove the cover hook by giving gentle downward taps with a file. Both hooks can then be examined and measured. If that part of the cover adjoining each leak has been marked during the emergence of each stream of bubbles in the oil bath, the seaming at the leaky point can be examined and after a certain amount of experience the type of leak likely to lead to a blown will be recognised at a glance.

When carrying out the oil bath test it will be noticed that when the cans are first put into the hot oil there is a rush of bubbles from the seaming. This ceases shortly afterwards and is to be ignored. In all probability it denotes escape of moisture and air previously caught up in the seaming. Actual leaks are revealed later on, after doming has occurred, by a steady stream of bubbles which does not cease but carries on the whole time the can is in the bath.

Experience has shown that the risks of blowing caused through the entry of micro-organisms into cans during cooling have been increased by water cooling. That is to say that momentary entry of bacteria with water into a microscopic wrinkle or gap caused by loose seaming is, for some reason, more likely than entry of bacteria in air. The contamination of the water supply can become very heavy in some pressure-cooling systems and may have a great deal to do with this.

This means that seaming will have to be more efficient than before now that pressure cooling has come into general use and that the pressure-cooling water should be chlorinated.

Sending Food by Rail in Wartime

With reference to the article, " Sending Food by Rail in Wartime ", published in the May issue of Food Manufacture, p. 159, it should be noted that :

Under the Railways (Carriage Paid) (Amendment) Direction, 1943, the only traffics which are now excepted from the " carriage paid " arrangements are :

(*a*) Merchandise carried under an agreed charge arrangement.

(*b*) Cattle, sheep and pigs.

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in Food Manufacture should not be taken as an indication that they are necessarily available for export.

Partial War-damage of Premises

An important ruling has been given by the courts which affects the relationship of landlords and tenants of war-damaged property, where it is partly capable of beneficial occupation.

In order to understand the point of the above decision, it is desirable to review briefly the position where property suffers war damage.

If, as the result of the damage, the premises have been rendered unfit for the purposes for which they were let or were being used, the tenant, by serving notice under the Landlord and Tenant (War Damage) Acts, can put an immediate stop, subject to certain qualifications, to his liability to pay further rent.

There are two main types of notice which the tenant can serve. If he desires to retain the lease, notwithstanding the damage, he should serve a notice of retention. The notice may be unconditional, or, again, it may be conditional on a value payment not being awarded by the War Damage Commission in respect of the damage.

If, on the other hand, the tenant desires to disclaim the lease, he should serve a notice of disclaimer, but the landlord may then serve a counter notice to avoid disclaimer.

In either event, viz., whether a notice of retention or a notice of disclaimer has been served, the tenant's liability for any further rent will therefrom immediately cease, though, of course, in respect of the period between the date of the damage and the date of the notice the full rent reserved by the lease must be paid by the tenant, even though the premises may have been entirely demolished. But premises, while they may be wholely unfit for the purposes for which they were let or used, may be to some extent capable of beneficial occupation. In such a case, although the tenant may have served a notice with a view to suspending his liability for rent, the landlord may, nevertheless, apply to the court for an order directing the tenant to pay a rent which is commensurate with the value of the premises in so far as it may be truly capable of beneficial occupation. If the court orders, on such an application, that a reduced rent should be paid by the tenant, does the reduction operate as from the date of the occurrence of the damage, or as from the date of the tenant's notice? The court held that there is no power to alter the rights of the parties to a lease in respect of any period prior to the date of the statutory notice which the tenant may have served, so that if on such an application a reduction of rent was ordered, the reduction could operate only as from the date of the notice.

This principle has also been held to apply to a " multiple lease," that is, a *single* lease of *different* buildings or parts of a building. When the lease is a multiple lease, in general, the leave of the court must be obtained before any notice served by the lessee can be regarded as effective. If the court comes to the conclusion that the lessee's notice is not to be effective, and that he is not to be at liberty to serve any effective notice, the court may, nevertheless, having regard to the extent of the damage, order a reduction of rent. Such a reduction, likewise, can only operate as from the date on which the tenant served the notice (subsequently treated as ineffective), and not as from the date of the damage.

Vegetable Dehydration

THE technique involved in the processing, dehydration and packaging of vegetables must be considered as in a transitory stage, and recommendations made to-day may be changed to-morrow. In Britain, the United States and Canada experimental work is resulting in new methods being developed that not only simplify processing, but improve the rehydration quality and the storage life of the product.

Data secured at the Fruit Products Laboratory at the Central Experimental Farm, Ottawa, Ontario, on blanching temperatures and time required for the inactivation of enzymes shows that higher temperatures than those ordinarily used in Canadian plants are required to get inactivation of the peroxidase enzyme.

Blanching

In general, steam is the ideal method of blanching. Traying in this case presents no problem. In addition, there is little leaching of those soluble solids which are a part of the nutritional content of the vegetable. However, certain products lend themselves more readily to the water blanch. In the water blanch, salt is usually added; the soluble solids from the material being processed are allowed to build up, and a minimum of make-up water is added. These precautions decrease the leaching losses when water blanching is indicated.

Use of Sulphites

Studies on the use of sulphites have resulted in different methods of procedure. Retention of bright greens in cabbage may be secured by sulphite treatments. A straight steam blanch bleaches the product, and the longer the blanch the more pronounced is the bleaching effect. Cabbage which is given a short steam blanch may have a very good colour, but the product usually discolours during the dehydration process if an optimum dehydration programme is followed. Sulphiting the cabbage protects the colour by fixing the chlorophyll and assists in the retention of vitamin C during the blanching and dehydration processes. Sulphited cabbage given exactly the same dehydration treatment as untreated cabbage has had as much as 100 per cent. more vitamin C.

Sulphiting Cabbage

There are several methods of treating cabbage with sulphite. Dipping the shredded cabbage in cold 0·05 per cent. and 0·1 per cent. sodium sulphite solutions for as long as fifteen minutes prior to the blanch results in a blanched product slightly better than the untreated cabbage, but the colour of the dehydrated cabbage is poor. The greens are dulled and faded, and the whites and yellows are muddied. The SO_2 content of this material is practically nil. A stronger solution is necessary. Samples given a 10-second dip in cold 0·5 per cent. and in 1 per cent sodium sulphite made much better finished products, the sample dipped in the stronger solution being the more attractive.

Hot sulphite dips prior to blanching give a dehydrated product of superior colour. The solution should be maintained at 0·1 per cent. at 200° F. While further refinements are undoubtedly necessary, a means of maintaining a satisfactory sulphite solution has been worked out in a commercial plant. This may form a workable basis in the absence of equipment for determining rapidly the SO_2 content of the dipping bath and of the finished material. An original 0·1 per cent. sodium sulphite solution was made up in an open wood tank where the liquid could be kept hot by steam injection. The strength of the liquid was maintained by adding 4 oz. of sodium sulphite for every 375 lb. of cabbage treated, and each bucket was drained before being placed on the trays. The table below indicates the SO_2 retention of cabbage treated with the hot 0·1 per cent. sodium sulphite in a commercial plant.

TABLE 1

SO_2 RETENTION IN DEHYDRATED CABBAGE

Treatment.	*SO_2 Retention.*
1. Cabbage dipped (plunged only) ...	540 p.p.m.
2. Cabbage held 15 seconds	670 p.p.m.
3. Cabbage held 30 seconds	1340 p.p.m.

Under conditions of plant operation, after several trucks had been processed, a sample of the finished cabbage showed an SO_2 content of 730 p.p.m. To secure 1,000 p.p.m. about twenty seconds in the hot sodium sulphite solution would be required.

Spraying the cabbage with a sulphite solution halfway through the blanching process is not satisfactory. Samples of such material from the same tray may have widely different SO_2 contents, due probably to insufficient penetration of the solution through the layers of the product, unequal distribution from the spray nozzles, or even clogging of the nozzles, especially when the water has an alkaline *p*H. Cabbage is sometimes sulphited after the blanch. In this case the colour is not protected during the blanching process. When this method is used, in order to retain colour, the blanching period is usually so shortened that the peroxidase enzyme is not inactivated. In addition, definitely underblanched material is often tough when cooked. If the blanching period is sufficient to destroy the peroxidase enzyme, the colour is bleached before the sulphite protection can be given.

The only method of retaining a fair colour in untreated cabbage during the dehydration process is by prolonged drying at lowered tunnel temperatures, a practice which decreases production and increases overhead, and frequently results in heavy destruction of vitamin C.

Sulphiting Other Vegetables

Green leafy vegetables may be sulphited similar to the method used for cabbage, but if the product mats when moist heat-treated the cold sulphite dips are indi-

Abstract of an article, "Method of Dehydrating Vegetables," by C. C. Eidt and Mary MacArthur, Division of Horticulture, Central Experimental Farm, Ottawa, Canada, published in Food in Canada, III, 3, 22.

cated. Spinach and Swiss Chard are in this category. A fairly strong cold sulphite dip of parsley and kale results in a highly coloured product with a high vitamin C content. However, it must be remembered that, although sulphiting assists in the retention of vitamin C, it reduces or destroys the vitamin B_1 content.

To prevent surface discoloration of potatoes during the holding period between peel and trim and sometimes between trim and strip, a sulphite solution up to 0·25 per cent. may be used. There is not sufficient sulphite penetration on these unstripped potatoes to reduce the vitamin B_1 materially, and such sulphite as remains on the surface is removed during the subsequent washing. This use of sulphite solution appears to be superior to the 2 per cent. salt used for the same purpose.

Dipping the stripped potatoes in a sulphurous acid solution for the purpose of bleaching should be avoided for several reasons. If the acid, which has rapid penetrative powers, permeates the thin strips, vitamin B_1 may be completely destroyed. In the hands of a careless operator the strength of the solution and time of immersion may be uncontrolled. Potatoes so treated certainly will not be discoloured. They may have a floury coating. They are usually hard and are difficult to refresh, will not mash easily when cooked, and may have that distinct sulphur flavour which cannot be cooked out. This hardening of the strips is very similar to the " firming " of berries packed in sulphurous acid solutions for export.

Discoloration of Potatoes

It is known that dehydrated potatoes generally discolour at high storage temperatures. At 100° F. the discoloration may be very marked, while at 80° F. there is a slight discoloration after several months. Experiments under way appear to indicate sulphiting as a method of delaying this discoloration. At the Central Experimental Farm laboratory the storage trials of potatoes so treated are not sufficiently advanced to give the SO_2 content which will cause the delaying action, but other sources indicate 100 to 125 p.p.m. SO_2 in the dehydrated product is sufficient. Cold sulphite dips of the stripped potatoes prior to the water blanch have not proved very successful in getting the sulphite in. Dipping the blanched washed strips in hot sulphite solution in a wooden tank has proved to be the best method. The time of the dip and the strength of the solution is dependent on the desired amount of SO_2 in the finished product.

Experiments to date have shown that dehydrated potatoes, immediately after dehydration with an SO_2 content of approximately 125 p.p.m., have the vitamin B_1 content reduced by about 50 per cent., and those with an SO_2 content of 650 to 1,000 p.p.m. have no vitamin B_1.

PROCESSING METHODS

Potatoes

In dehydrating potatoes, waste by abrasive peeling will vary from about 22 to 30 per cent.; therefore for large-scale operation this waste should be utilised for starch recovery. On the basis of the production of approximately 4 tons of dried potato a day a recovery of starch in excess of 1 ton could be made.

Where starch recovery is a factor the potatoes must be thoroughly washed as a preliminary stage. For this purpose a commercial soaker-washer is necessary. Where starch recovery is not a factor the first step of processing is peeling. Methods adopted in Canada have been to abrasive peel. To date our records show that there is less loss in peeling by using the drum- or batch-type peeler than the continuous abrasive peeler.

The amount of peel to be removed will be dependent on the balance of subsequent labour required for trimming and the loss secured in the raw vegetable. Hand labour, which is required for trimming and is expensive, may justify heavy abrasive peeling.

Potatoes discolour quickly after the peel is removed if exposed to air, and this discoloration shows up in the finished product as blackened strips. To guard against this the potatoes should be dipped in a tank containing 2 per cent. salt solution or mild sodium sulphite before trimming.

The potatoes are then run to a trimming table, where eyes, digger blemishes, bruised or diseased areas are removed.

The potatoes should then be stripped immediately. For this purpose an Urschel stripper has been found very satisfactory. A strip $\frac{3}{8}$ in. by $\frac{1}{4}$ in. has been found ideal. It is, however, important that the slices be cut $\frac{1}{4}$ in. thick and the arbour be set to cut the strips $\frac{3}{8}$ in. wide, rather than the reverse. In potatoes, thick slices cut thinly the reverse way cause a large percentage of broken pieces in the finished product.

After stripping, the potatoes must be thoroughly washed to remove free starch from the surface of each strip. Otherwise in subsequent processing a layer of cooked starch on the outside of the strips will result in a " case-hardened " product very unsatisfactory in appearance. In addition, this product does not refresh well.

Hot-water blanching has been most satisfactory with potatoes, although the Fruit Products Laboratory, Summerland, B.C., reports that they have had satisfactory results with steam blanching the variety Netted Gem. Conditions of blanching and dehydration are given in Table 2.

Storage results to date show that potatoes maintained under high-temperature conditions—100° F.—for a few months discolour badly.

Carrots

Carrots are first abrasive or lye peeled. Results in our laboratory indicate that by using 3 per cent. lye at 200° F. for three minutes a satisfactory peel can be secured. Losses, trimming plus peeling, in these lye-peeled carrots run as low as 10 to 12 per cent. With abrasive peeling, losses up to 30 per cent. may occur. In lye peeling, brushes must be used to remove the peeling residue.

After carrots are peeled they must be trimmed to remove the crown and discoloured or bruised areas. They are then stripped the same as for potatoes.

Enzymes are easily inactivated in the carrot and steam blanching is recommended.

Turnips

Losses by abrasive peeling are comparatively small, and this method is therefore recommended.

After peeling, the turnips should be roughly trimmed and then blocked into pieces approximately 2 ins. square. This can be done by using a heavy knife or

TABLE 2

CONDITIONS OF BLANCHING AND DEHYDRATION FOR DIFFERENT VEGETABLES

Vegetable.	*Blanch.*			*Dehydration.*			
	Type of Blanch.	*Temperature of Blanch.*	*Time in Minutes.*	*Start.*	*Finish.*	*Finishing.*	*Probable Drying Time.*
		(*Deg. Fahr.*)		(*Deg. Fahr.*)	(*Deg. Fahr.*)	(*Per cent. R.H.*)	*Hrs.*
Potatoes, fresh dug ...	Water	206-208	2½-3½	180	150-155	10	4-5
Potatoes, stored ...	,,	206-208	3-4½	180	140-145	10	4-5
Carrots	Steam	206-208	5-6	180	150-155	8-10	4-5
Turnips	,,	212	7-8	180	150-155	10-12	5-6
Cabbage from field ...	,,	208-210	3-4	180	135	10-12	5-7
Cabbage from field, sulphited	,,	208-210	3-4	180	145	10-12	5-6
Cabbage, stored ...	,,	208-210	6-7	180	122	10-12	6-8
Cabbage, stored and sulphited	,,	208-210	6-7	180	134	10-12	6-8
Onions	None	—	—	180	140	10-12	5-6
Beets	Water	204-206	3	180	150	12-14	4-5

butcher's cleaver. At this time turnips showing brown-heart or excessive " woodiness " can be spotted and discarded.

The pieces then go to the trimming table for removal of blemishes. The blocked pieces then pass to the stripper.

The enzymes which cause discoloration in the dehydrated product are very difficult to destroy in turnips. Steam at a temperature of 212° F. for seven minutes is required. This necessity for a long blanch at a high temperature must be stressed. It is mainly for this reason that steam blanching is recommended. However, a satisfactory product can be obtained by blanching in boiling water to which 2 per cent. salt has been added, and the concentration of solutes from the blanched material is allowed to build up.

Cabbage

As previously mentioned, the best dehydrated products are produced from cabbage freshly harvested from the field. Results secured at the Fruit Products Laboratory, Kentville, N.S., would indicate that the addition of two or three of the more tender outside leaves of cabbage improves the colour and rehydration appearance of the product. These leaves should be removed and washed separately. Stored cabbage should be trimmed to remove all discoloured leaves. The cabbage can then be quartered and the cores removed. In many commercial plants a core shredder is used to pulp the core before the cabbage is finally shredded. Much larger yields are secured by this method, and, provided the operation is thoroughly done, the finished product is excellent.

The whole cabbage, after trimming, should be coarse shredded. A kraut cutter is ideal for this job, but the knives should be set much coarser than for kraut manufacture—that is, for a thickness of $\frac{3}{16}$ in.

The cabbage is then blanched in steam. The time and temperature of the steam blanch is given in the general blanching table.

Onions

Onions should be peeled and trimmed. Hand peeling is expensive. One manufacturer using flame peeling finds this method highly satisfactory and trimming losses are reduced to a minimum.

The trimmed onions are then sliced and a commercial tomato slicer or kraut cutter is used for the purpose.

No advantage has been secured by blanching onions. The slices are merely trayed and dehydrated.

Beets

The recommended method for beets has been to cook whole, slip the skin, slice or strip and then dehydrate. This method, while producing a satisfactory product, is not adapted to large-scale production.

A method developed at the Kentville Experimental Station has produced better quality dehydrated beets than any other we have tried. The procedure is to abrasive-peel the raw beets and trim. The beets are then stripped or diced. A hot-water blanch is then given, using 2 per cent. salt in the blanching liquor, and by using a minimum of make-up water the concentration of the solutes is allowed to build up until the liquor becomes blood-red. A few trays will be rather pale, but these can be thrown away. If the water is excessively alkaline the water will turn amber instead of red. Sufficient hydrochloric acid can be added to maintain the red colour, or the *p*H may be determined and the water kept at a neutral point.

(*Continued on page 229*)

A Case against Milk Pasteurisation

The author of this article, who is a soil bacteriologist, describes it as "a protest against out-of-date ideas regarding the relation of some diseases to the bacteria supposed to cause them." He states that he is challenging a whole philosophy; not merely instances of its working. FOOD MANUFACTURE is an advocate for the pasteurisation of milk and the author's opinions are published in pursuance of the policy *audi alteram partem*.

HUGH NICOL, M.Sc., Ph D. (Lond.)

EVERY writer knows that his own lack of attention, or a trick of fate, occasionally perverts his meaning by altering a figure or bringing nonsense to an argument through a printer's error or other cause. To such slips all are liable, and the best that can be done is to note the mistake and to correct it in a subsequent edition or as opportunity offers. When a writer on child care, in one of the standard text-books on infant feeding, states that the ash of milk is composed of salts of citric acid the non-medical chemist is forced to pause; and when he sees that this statement occurs in the seventh or eighth edition, he is likely to come to certain conclusions. One is that the author does not know very much about the composition of one of the chief articles of infant diet; another is that his colleagues are not better informed about the basic matters of chemistry, or they would have drawn his attention to the error.

Looking a little wider, it appears that the medical profession as a whole tends to ignore the sciences related to medicine. However, the milkman usually knows less about the theory underlying pasteurisation than does the medical man or a teacher at a centre encouraged by the large dairying firms; and the public as a whole is no better informed, and (except for a minority of nature-curists) is content to take the medical profession and the worth of medical knowledge about biology at the value set upon it by the profession itself.

An Inadequate Theory Established

The only kind of microbiology that the public has consistently had an opportunity of learning about has been the microbiology of pathogens—chiefly human pathogens. They have learnt this from a spate of books and films written by medical men or by interpreters of the medical point of view; and these productions have been almost invariably biographical studies of researchers into pathogenic microbiology, glorifying the "devoted scientists" and the pathogenic microbe. There is quite a lot of microbiology outside medical microbiology; much of it important in food manufacture, while the non-pathogenic microbes in soil are fundamental to the existence of life upon the earth.

The medical profession has no care for any of this. Pasteur showed that bacteria are the "cause" of disease; and—except for the developments in immunology based on the microbial theory of the causation of disease—the medical profession has abidingly learnt no fresh point of view since Pasteur's time. It is the medical profession which teaches advertisers and the public about the dread germ as the "cause" of disease, to the point of excluding any more rational and balanced hypothesis. The medical profession cannot teach what it does not know about; hence the medical insistence upon pasteurisation as an effective means of destroying the tubercle bacteria and other "causes" of disease latent in milk. I do not deny that proper pasteurisation effectively renders harmless most of the important pathogenic bacteria present in milk; and the question about the efficiency with which pasteurisation is performed is a side-issue.

Medical Skills and Science

It is doubtful whether the majority of the members of the medical profession are scientists or are qualified to speak for science. In relation to milk pasteurisation this incapacity is evidenced by the lack of prehension of modern concepts among medical bacteriologists and *a fortiori* the run-of-mine member of the profession. The public does not need to understand the principles of science, but it is important that they should not continue to be fed, in the matter of pasteurisation, with results of outmoded concepts.

The medical mind is more akin to that of the artist and craftsman than to the scientific. If my baby were ill I should be delighted to have the advice of the gentleman who wrote about the ash of citric acid: the fact that he knows practically nothing about chemistry would not weigh with me, for I should be relying upon his clinical experience of babies and not upon his chemistry. That is to say, I should appeal confidently to his experience and personal skill, just as one does when one selects a painter for one's portrait. But such people cannot reasonably be regarded as scientists, and should not arrogate to themselves the right to speak as scientists.

A Note for the "Small" Milkmen

I am not writing primarily *for* the producer-retailer or *against* the medical profession or the big interests. I am concerned to outline an up-to-date presentation of the germ theory of disease (its proper name is the ecological theory) and to show how it relates to the question of pasteurisation.

I suppose the producer-retailers are mostly "small men", most of whose time is occupied with producing and retailing and the details of getting a living. They have kept their noses rather than their ears to the ground and have not heard the stirrings of the ecological theory which could help them to confute the advo-

cates of pasteurisation. It seems that the "small" milk-producer has let the "big" ones get ahead of him in jumping for the big drum. The "small" man seems to have rather a contempt for scientific investigation and teaching; at least, the research and teaching institutes are not notably supported by "small" men; and, urged by the medical profession's out-of-date though sincere and disinterested theories, and the not disinterested but understandable propaganda for pasteurisation put out by the "big" firms, teaching is going heavily against the small man. The producer-retailer is letting an excellent scientific case go by default.

The Dogmatic Approach

The attitude of the medical profession is symptomatic. Dr. L. P. Garrod, Professor of Bacteriology in the University of London, and Bacteriologist to St. Bartholomew's Hospital, has written in two issues of *Country Life* this year (February 12 and May 28) the fairest attempt I have seen to meet the case against pasteurisation. He admits (May 28) that there are a few medical men who oppose pasteurisation. I put no weight upon this admission, and quote it merely because of what it leads up to in Professor Garrod's presentation. He says that as far as he knows these dissidents include no one with "the special knowledge of the sciences of nutrition and of bacteriology which is necessary to form reasoned judgments on the various aspects of the subject". But: "On the other hand" (and these are my italics) "*the whole weight of expert medical opinion is in favour of pasteurisation*"; and he goes on to give the names of the heavy-weight medical bodies which embrace pasteurisation as their declared policy.

We thus have the appeal to authority. This is characteristic of the dogmatic approach, not of the scientific; it is admissible, because it is the only appeal, in matters of faith rather than of reason. The "reasoned judgments" to which Professor Garrod refers are, of course, those which agree with medical pronouncements; and it is implied that only medical specialists in bacteriology can have the necessary special knowledge for forming these judgments. This is another instance of the exclusiveness which leads medical men to write books on animal hormones and to suggest that the whole field has been covered; for, indeed, "bacteriology" to the medical mind—as in the title of the Professor's Chair—means *only* medical (and veterinary) bacteriology. The proposition is probably unchallengeable that anyone who has been trained only in medical bacteriology is unlikely to come to any other conclusion about pasteurisation than that to which the medical experts have come; but medical bacteriology is a circumscribed field, of which the occupants seem seldom to look over the hedges.

So it is justifiable to ask whether the medical profession has, in fact, not the *special*, but that general knowledge of bacteriology and science "which is necessary to form reasoned judgments" about the subject. The fact that the profession is reduced to counting heads and to appealing to authority and numbers tells against it; for the technique of voting has no place in scientific method. By this very appeal the medical profession has shown that it prefers the dogmatic to the scientific approach and the hieratic to the methodological.

Science and Art

In truth, medicine as it is generally practised is an art and not a science, while surgery is a craft. Both medicine and surgery require much experience and expertise. Both medicine and surgery make use of deduction, but, except for the circumstance that these deductions are based partly upon facts acquired by generations of observation of the kind termed scientific, the deductions typically relate to one person—the patient—and do not usually possess that generality and instinct hieratic. The Research Defence Society is a medical organisation; it is not, as one might think, concerned with defending all research, or even medical research in general; its main concern is vigilance to maintain the practice of vivisection. It is not my purpose to discuss the ethics of vivisection; but I may point out that the title of the Society is symptomatic of that fixity about new ideas which has left medical bacteriologists in a Pasteurian attitude towards the germ theory of infection.

If every doctor is to be called a scientist and hearkened to as one because he deals with or takes cognisance of technological material such X-ray apparatus, sulphonamide drugs, or pathogenic bacteria, then the plumber has an equal right to be considered an expert metallurgist, and his opinions about alloys and the phase rule should be listened to with the utmost respect in metallurgical laboratories and councils; likewise the actress is an expert about the manufacture of textiles, and the liner steward equally with the engineer officer merits consultation about the problems of marine navigation.

The public (and indeed the practitioners concerned) recognise the distinctions in such cases. But as regards the vast and inchoate medical profession so recently emerged from the state of possessing all knowledge outside divinity, classics, and law, the public is bemused and undiscriminating.

An Earlier Over-reaching

A generation or so ago there was no dietitian who would not cheerfully have gone to the stake rather than admit that there was anything material to learn about the nutritive properties of foods. There were minor disagreements about quantities and about the numbers of calories required from, or to be attributed to, various components of foods, and there were differing views about the value to be given to the inorganic salts. But such details did not obscure the grandeur of the achievement that, thanks to science, and to calorimetry in particular, practical finality had been reached about civilised diet. The practices that centred upon calories and purity were carried so far that many foods—especially those intended for infants and invalids—were denatured, devitaminised, and sterilised: all with the best intentions and the greatest good faith and belief in modernity.

Now we have changed all that. Or have we? The emphasis has altered, it is true. We no longer think exclusively in terms of calories and purity. We now know all about vitamins, or as near all as makes no matter. Having corrected the old errors, we are free to pontificate again. Upon the facts that pasteurisation does not appreciably alter the vitamin content of milk, and a few more facts relating to the effects of pasteurisation upon the nutritive values of milk as the term "nutritive values" is understood today, our

medical friends and other people upon the fringe of the medical profession are ready to go to the stake to sustain the thesis that pasteurising milk does not harm it as a food. I accept the observational facts, but am doubtful about the deduction. The majority of the medical profession have no doubts. Are they really sure? Yes, quite, *quite* sure. But so they were a generation or two ago.

The other Side of Infection

Fifty years ago there were doubts about the inevitableness of infection. Some early investigators failed to produce cholera in themselves by ingesting cholera bacteria. This did not necessarily lead to general doubt about the specificity of Koch's comma bacterium, then newly discovered; for, as Sir Ray Lankester put it about 1907: "Few, if any, investigators of this question gave up, as a consequence, their conviction that Koch's bacillus was the real and active cause of cholera." But: "They supposed that it must be necessary for the human intestine to be in a favourable condition—an unhealthy condition—for the Koch's bacillus to multiply in it."

Today, however, such saving clauses in the theory of bacterial causation of disease have largely fallen into desuetude. I do not say that they are unknown; they may even be taught in medical schools; but, if so, it must be as odd theories having a quaint historical flavour and not as the starting-points of doubt, enquiry, or action. In remembering half of the germ hypothesis of disease and neglecting the other and equally important half, the medical and veterinary professions have thrown out the baby while cherishing the dirty water.

The Importance of Conditions

Every medical officer of health has within his precinct a pasture, a filter-bed, or a haystack. Grassland is like a large organism. It is an ecological entity, of which the composition of the population is decided entirely by conditions. In order to put that proposition forward as true it is not necessary to be able to state what the conditions are that produce any particular effect or result. If the conditions—whatever they are, known or unknown—are unsuited to the growth of a species about to be introduced from outside, that species will not grow; and the converse is equally true.

In various parts of filter-beds there are different associations of macro- and micro-organisms, depending upon the conditions, and indicating those conditions by their presence; but any inoculation or artificial introduction is bound to fail if it is "against the grain" of the ecological entity formed by the filter-bed populations. There are calorifacient microbes in every bundle and stack of hay; but the hay will not "fire" or spontaneously heat beyond a safe limit unless conditions are right for it to do so. In some cases we know roughly what the undesirable conditions are; thus in the self-heating of hay it is known that the presence of undue amounts of moisture has a great deal to do with it; while the apparently spontaneous fermentation of honey is primarily due not to the yeasts and other microbes commonly incriminated (for such are present in most samples) but to an excess of moisture which permits them to act.

"'A babbled of green fields"

It follows that the question whether weeds are to be present or not on grassland is wholly within the control of the farmer—or, it may be, of the food factory which has plots of grass—unless, of course, external causes prevent the appropriate control from being exercised. (Current fertiliser restrictions make it difficult to manage grass so as to secure optimum control of lawn weeds.) The best demonstration of this generalisation is on Park Grass experimental meadow, which was established in 1856 at Rothamsted. The demonstration is therefore as old as the work of Pasteur, but its significance has not penetrated into medical teaching.

On the analogy of the propaganda for pasteurisation of milk, the medical method for avoiding invasion of weeds into a meadow would be to heat the ambient air so as to render weed seeds non-viable, or to surround the meadow with a high wall or a muslin fence. The fact is that the omnipresent seeds do not contribute anything to the composition of the flora unless they are of the same kinds as are already present, or unless there is some exhaustion or other change in the soil that renders the soil receptive to infection by fresh species.

What Ecology Is

This is the outline of the ecological view, more widely based than most current conceptions of pathological infection. Its most important tenet is that nutrition and infection must be considered together. Also, when an infection can be proved to be related to unbalanced nutrition, the infecting agent should be regarded as a sign or indication and not as a cause. As regards tuberculosis, medical opinion seems to be in two minds. If the medical profession's germ theory were consistent only with the practice of some nutritionists—to say nothing of modern ecological thought—the profession would realise that the presence of tubercle bacteria in animal or man is only an indication of poor nutrition. It would also be seen that killing every tuberculosis germ in milk would leave the real problem untouched.

Discrimination about Correlation

Scientific training leads us to seek for causes and to connect them with effects. Many practical people and some scientists (unfortunately) have insufficient training to enable them to argue percipiently about the relation between cause and effect. In New Zealand a few years ago there were farmers who were convinced that superphosphate was the cause of a non-infectious wasting condition in sheep. On a limited view—as limited as that of the orthodox theory of milk-borne tuberculosis—they were right. Just as with the germ theory, there was ample correlation between the application of "super." and the incidence of the disease which it caused. The truth was shown to be that the sheep were suffering from cobalt deficiency before the "super." was applied; hence the application of "super." did make things worse. Yet it was not the cause of the condition, though it may have made the condition evident where before it was only latent.

Most farmers in the affected areas in New Zealand have abandoned their condemnation of "super." as the ostensible cause of this wasting. It seems to be easier

to convince farmers of an error of judgment than it is to convince the medical fraternity. One reason for this may be the absence of experiment about nutritional imbalances generally, comparable to that which revealed the real cause of cobalt "pining". There are many analogies referring to what is now well known in agricultural circles about the relation between nutrition and worm infestation of animals. The parallel with, say, human tuberculosis is striking.

A Case to be Answered

The insistence of the medical profession upon pasteurisation seems to be fundamentally due to lack of curiosity about the negative cases of people and animals in which germs do not produce the specific disease which they are supposed to cause. It is concurrently due to the lack of a wide enough knowledge of micro- and macrobiology. These causes operating upon the partly practical and partly mystical medical mind lead it periodically to exhibit a fierce faith in rather questionable dogmas.

I do not claim that all germ-induced diseases will yield to nutritional factors. But as regards farm livestock diseases with a bacterial nexus, and as regards those pathogenic microbes commonly originating on the farm and carried in milk, the facts strongly suggest that there is a case to be answered which the medical profession has not enquired into. The medical case, which is based only on incidence of infection, is puncturable. And so far from the medical bodies having all the knowledge, there is a great deal of relevant matter that they do not know, both as to facts and methods.

The matter is largely one for education supplemented by research along novel lines. It is significant that the plant pathologists—a new body of people who have had the chance to develop an outlook independent of that of the animal pathologists—are rapidly tending towards the ecological standpoint. Many soil-borne plant diseases "caused" by fungi are known to have their incidence diminished by good soil management. This decrease comes about in a way which must be inexplicable to people who can conceive only of disinfectants or heat as means of countering the microbes of disease.

Research upon the connection between nutrition and disease should include farm livestock as well as human subjects. It would thus interest the meat trades as well as the farmers, the milk industry, and the sociologists. It has been left to a few enterprising farmers and to some enthusiasts about particular products (*e.g.*, dried grass) to show practically that good nutrition of livestock predisposes towards absence of the ordinary bacterial diseases. "Good nutrition of livestock" necessarily includes good management of farm land; hence the field for research is nation-wide.

"Bacteria are Good for You"

Whereas the animal pathologists appear to be innocent of the ecological approach proper, Professor Garrod (*Country Life*, February 12) has noted that some people think that to swallow a few tubercle bacilli is beneficial. The conclusion that a light infection may be beneficial is arguable. It derives from the popular idea that everyone must necessarily "eat a peck of dirt before he dies". This is possibly an instinctive empirical version of the ecological view. However, to *rely* upon unpasteurised milk for a prophylactic infection is a haphazard method hardly to be commended. Upon this point the essence of the ecological view is not that tubercle bacilli are good for you; it is that to a properly nourished higher organism a few tubercle bacilli do not matter. This represents a distinction of which the medical profession is not yet in a position to grasp the significance.

It is legitimate for people in the milk industry to say that unless they can pasteurise their milk there will be serious practical disadvantages, such as loss by souring. Such a contention brings up a number of incidental points, like questions of farm cleanliness, milk pooling, and bulk transport. But let this practical aspect of milk distribution be kept separate from the medical theories which have become fortuitously bound up with it. The "big" dairymen have a good case on practical grounds alone, and if that goes with the encouragement of farm methods such as would ultimately supersede heat-treatment, so much the better. But because pasteurisation suits them, the "big" milkmen should not try to tie the small producer or retailer to their own cart to drag him along willy-nilly; nor should the medical profession collaborate in this roping-in. The medical profession has from the best motives attacked the sign instead of a cause, and has thereby convicted itself (not for the first time) of wrong-headedness about a scientific thesis. But let the several sections of the milk industry exist by their own efforts and by their own light; for to call upon "science"—as that is exemplified by the medical attitude of today—in order to compel the adoption of a trade practice, is to put odium upon real science. May the scientists not cease to proclaim that the truly scientific philosophy is the only one that is consistent with freedom in practical affairs.

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Vegetable Dehydration

(*Continued from page 225*)

In general, the methods followed for cabbage are satisfactory for other leafy vegetables, and root crops can be dehydrated by the methods described for carrots and turnips. Certain vegetables require special methods. Peas respond to sulphite blanching. Small adjustments as to process have to be made for each vegetable.

Table 2 outlines the blanching and dehydration procedure for the more important vegetables used for dehydration purposes.

From the above it is obvious that blanching and dehydration conditions for various products can only be given approximately. Our work with cabbage shows that enzymes can be inactivated quickly in freshly harvested cabbage, but that stored cabbage requires longer treatments. Fresh dug potatoes can be finished at high temperatures, but by March or April temperatures as low as 140° have to be used.

Sulphites have a marked effect on the retention of colour in long blanching. Sulphited cabbage can be blanched for as much as ten minutes without loss of colour, whereas unsulphited cabbage will lose colour after four or five minutes. In dehydration, sulphited cabbage can be finished at a temperature approximately 10° F. higher than untreated cabbage.

The Combined Food Board

GLOBAL planning of the United Nations food resources and the most expeditious use of their food supplies is the concern of the Combined Food Board. Its task is similar to that of the Combined Raw Materials Board, in that both serve to foster the production of, and to allocate resources from all over the world, to the consumers who are widely dispersed. In this, these two Boards differ from other Boards, which distribute resources concentrated in two or three great centres. The problems facing both Boards are illustrated by the steps made necessary by the Japanese seizure of the rich territories of the South-West Pacific. The Combined Raw Materials Board has been tackling the problem of rubber, the Food Board that of vegetable oils. In each case the problem is to foster production in other centres and to allocate the existing stocks and the new production in the most economical manner. Both Boards are situated in Washington, but in each case there is an independent but closely associated body in London which has the particular task of collecting data about the requirements and resources of the British Commonwealth in the Eastern Hemisphere and building them up into a properly co-ordinated picture for relay to the Boards in Washington. In this way the work of the Boards is much simplified and full use is made of the great knowledge of world resources and their utilisation which is available in London from years of experience of international trade in commodities.

The Machinery

The Combined Food Board was established on June 9, 1942, by the joint announcements of the Prime Minister of the United Kingdom and the President of the United States. The duties of the Board shall be :

> "To consider, investigate, enquire into, and formulate plans with regard to any question in respect of which the Governments of the U.S.A. and the U.K. have, or may have, a common concern relating to the supply, production, transportation, disposal, allocation or distribution, in or to any part of the world, of foods, agricultural materials from which foods are derived, and equipment and non-food materials ancillary to the production of such foods and agricultural materials, and to make recommendations to the Governments of the U.S.A. and the U.K. in respect of any such question.
>
> "To work in collaboration with others of the United Nations towards the best utilisation of their food resources, and in collaboration with the interested nation or nations, to formulate plans and recommendations for the development, expansion, purchase, or other effective use of their food resources.
>
> "The Board shall be entitled to receive from any agency of the Government of the United States and any department of the Government of the United Kingdom any information available to such agency or department relating to any matter with regard to which the Board is competent to make recommendations to those Governments, and, in principle, the entire food resources of Great Britain and the United States will be deemed to be in common pool, about which the fullest information will be interchanged."

Secretariat

The Board is served by a joint Secretariat charged with maintaining contact with the various U.S. agencies which deal with food and food conditions, and with creating standing or *ad hoc* committees to give preliminary consideration to matters falling within the terms of reference of the Board.

The Secretariat has established Committees to deal with the following questions :

The Committees in Washington are : Oils and Fats. Meat and Meat Products. Dairy Products. Sugar. Agricultural Seeds. Spices, Cocoa and Coffee. Fertilisers. Import Programmes of the United Nations. Post-War and Rehabilitation. Vitamins. Fruit and Vegetables. Agricultural Food Machinery. Dehydration. Rice. Pulses.

The Committees in London are : U.K. Agricultural Production. Tea.

London Food Committee

The London Food Committee of the Board has been established under the chairmanship of the Parliamentary Secretary to the Ministry of Food with the following membership :

Australia, New Zealand, South Africa, Southern Rhodesia, India, and, for the United Kingdom, Ministry of Food, Colonial Office, Dominions Office, Treasury, Foreign Office (representing the Fighting French, Belgian Congo, Turkey and the interests of South America), Ministry of War Transport (representing *inter alia* the Middle East Supply Centre), Board of Trade (Post-War Commodity Policy and Relief Department), United Kingdom Commercial Corporation, War Cabinet Offices (representing interests of U.S.S.R. in extra-Protocol supplies), and the Ministry of Economic Warfare (representing interests of European neutrals other than Turkey).

The Secretariat to the London Food Committee is provided by the Ministry of Food.

The London Food Committee is responsible for presenting to the Combined Food Board in Washington a complete Empire (excluding Canada) and, in some cases, United Nations picture, both as regards potential supplies and essential requirements of commodities under consideration. Normally the Committee is the sole channel of communication between the Governments represented on it and the Combined Food Board.

This Committee works through small and expert sub-committees dealing with specific questions. Nine such sub-committees have already been established to deal respectively with meat, oils and fats, dairy products, rice, canned fish, dried fruits, sugar, dehydration and miscellaneous commodities. In addition, two joint sub-committees on fertilisers and food and farm machinery have been set up.

Activities

The Board is giving primary consideration to two urgent problems : (1) the equitable allocation of foodstuffs in short supply in accordance with essential needs ; and (2) the economy of ocean-going tonnage needed to convey the required international movement of foodstuffs.

With regard to the equitable allocation of foodstuffs in short supply, the Combined Food Board takes a long-term view of local conditions affecting the United

Nations, and tries to make provision against circumstances which may arise in the future. Co-ordinating purchasing and allocation schemes are already in operation in the case of tea, oils and fats, sugar, canned fish, South American meat, and rice.

Purchase of Commodities

It was announced on September 11, 1942, that negotiations for the purchase of the tea crops in 1942 had been completed by the Governments of India and Ceylon and the Ministry of Food, acting on behalf of the Tea Committee of the Combined Food Board.

On September 28, 1942, the Combined Food Board announced that an Agreement had been reached which provided for exclusive buying by the United States in certain prescribed regions of the world and by the United Kingdom in other areas, on behalf of all the Governments adhering to the Agreement (United States, United Kingdom, Canada, New Zealand, Australia and South Africa), of fats, oils, and oilseeds available to the United Nations throughout the world. The Agreement provides (1) that the United States will be the exclusive purchaser, on behalf of the Governments adhering to the Agreement, of all oilseeds and oils and fats in the North and South American Continents, including the Caribbean Islands, with the exception of animal fats in Argentina and Uruguay; copra in Tahiti and all Fighting French Pacific Islands; and all oilseeds and oils and fats in Portuguese Africa, Spanish Africa and Liberia; and (2) that the United Kingdom will be the exclusive purchaser, on behalf of all the adhering Governments, of all animal fats in Argentina and Uruguay; all oilseeds and fats in British Empire countries, with the exception of territory mentioned above; all oilseeds and oils and fats in Fighting French Africa; and all oilseeds and oils and fats in the Belgian Congo.

The supplies purchased by these two Governments will be allocated among the United Nations according to recommendations made from time to time by the Combined Food Board and accepted by the Government in question.

Ministry of Food—Meat Purchaser

It was announced in Washington on February 21, 1942, that, under a Combined Food Board recommendation, the British Ministry of Food would be the sole purchaser of meat, on behalf of the United Nations, from Argentina, Brazil, Paraguay and Uruguay. Acceptances of the Ministry of Food as the sole South American buyer were received by the Combined Food Board from the Governments of the United States, the United Kingdom, Canada, Australia, New Zealand, South Africa, Newfoundland and India.

The Board has recommended that every practical effort be made to increase production of rice in all producing areas still available to the United Nations, and that, wherever possible, consumption be limited as far as consistent with essential requirements and the availability of substitute grains and other foods.

One of the items in the planning of the Combined Food Board's programme is to cut down the tonnage used in transporting food overseas. Even in wartime food takes up 40 to 50 per cent. of the tonnage used in transporting goods to the United Nations. Many methods in solving this problem will be used by the United Nations. The main ones are: (1) to produce food as nearly as possible to the places where it is to be used; (2) to ship food by the shortest possible routes; (3) to reduce the bulk of foods to the minimum. The Board is planning this in the following way: (*a*) collecting the forward import programme of the United Nations for the period July 1, 1942, to December 31, 1943; (*b*) the routing of food shipments is worked out jointly by the Combined Food Board and the Combined Food Shipping Adjustment Boards; (*c*) the reduction of bulk in foods has been effected by the dehydration of eggs, apples, potatoes, meat, etc., and orange juice has been concentrated.

Food Reserves for Liberated Territories

Food problems of liberated territories are discussed by the Board, which is making recommendations to establish certain reserves. For instance, the U.S.A. is accumulating a vitamin A stockpile for use in liberated areas, and is also purchasing in advance agricultural seeds.

Correspondence

Calcium Metabolism

TO THE EDITOR OF FOOD MANUFACTURE

SIR,—The full text of the paper "Calcium Metabolism and some Present-day Problems in Nutrition", which I read before the Royal Society of Arts, will be published shortly along with the subsequent discussion.

In his comments on your editorial note of this lecture, Dr. Isaac Harris reproduces his now familiar personal impressions, which have already been corrected elsewhere: *B.M.J.*, 1941, **1**, 276, 281, 291, 292; *Lancet*, 1941, **2**, 241, 294; *Lancet*, 1942, **1**, 780; *The Times*, April 18, 1942.

In addition, he misrepresents facts. In my lecture, I did not "assert that the quantity of calcium added (to bread) is negligible"; I suggested that it is unlikely to be harmful. Local authorities do not "decalcify water because hard water has always been considered injurious to health"; they do it so that our water-pipes, kettles and the like will not be filled with lime deposits and so that our soap will go further.

Dr. Harris criticises the work of McCance and Widdowson (*J. Physiol.*, 1942, **101**, 44 and 304) on phytic acid because "the number of cases is too small". They studied six men and six women; yet Dr. Harris drew definite conclusions from a study of *three rabbits* (*B.M.J.*, 1941, **1**, 49).

Instead of writing letters containing dogmatic generalisations, why does Dr. Harris not set to work to produce some scientific evidence in support of his unique views on calcium metabolism?

Yours, etc.,

J. DOUGLAS ROBERTSON, M.D.

THE MIDDLESEX HOSPITAL MEDICAL SCHOOL,
LONDON, W. 1.

Lessons Taught by Wartime Feeding

In his presidential address at the first annual meeting of the reconstituted Food Education Society on May 31, Lord Horder stressed the necessity for setting the seal of permanence upon the fine work, done under stress of war, of distributing essential foods at a price every citizen can afford to pay. An advocate of wholemeal bread and milk pasteurisation, he expressed his opinions on long- and short-term policies in connexion with these articles of food.

SPEAKING of the function of science in relation to nutrition, Lord Horder said that there is an idea in the minds of many that we have to await a mandate of science before we can safely embark upon the road of a sound national food policy. This error has arisen partly from a wrong conception of the function of science in human life and partly from the public utterances of scientists themselves. But the best scientists warn us that, as Sir W. Bragg says, "Science is built up on the accumulation of experiences, and every scientist knows that he must not base his conclusions only on the last few experiments in the laboratory. He must take into account all that has been done before." Omission to do this is the reason why we have swung from calories to vitamins and back to calories again. We must remember that true science and the true scientist always hesitates to say the last word.

Milk and Bread

Discussing the bread situation, Lord Horder said that it has settled down, for the time being at all events. The point of stable equilibrium is a compromise between the extremists—those who press for wholemeal and those who hanker after white bread. The appeal on the grounds of the exposure to extreme peril of the men of the mercantile marine and the urgent need of tonnage for the munitions of war proved more convincing than the appeal on the grounds of health. The optimists among us (continued Lord Horder) hope that a few years of close familiarity with national wheatmeal will break the faulty habit of three generations. The degree of ignorance and therefore of prejudice concerning the bearing of bread upon health is scarcely credible. Mentioning the addition of calcium to bread, he declared that the nation in general has been satisfied with the assurance that the amount of lime added is quite unlikely to do any physiological harm; that the total availability of calcium in the wartime diet, considered as a whole, needs supplementing for safety's sake and recognised that bread is the only medium of general consumption which can be used for the purpose. Lord Horder wanted to get into people's heads the idea of running a short- and long-term policy with regard to bread. The short-term policy is to maintain the nutritive quality of the national loaf at as high a level as possible consistent with a minimum expenditure of life in transport and winning the war at as early a date as possible. The long-term policy is to continue to educate people to like and to eat wheatmeal rather than white bread as a step towards wholemeal.

Turning to milk, Lord Horder said that it was another example of the need for running a short-term policy synchronising with a long-term one. The latter is to render our cattle healthy and to teach the milk producer and distributor to be clean. Meantime, with the farmers stimulated to produce more and more milk, there is more and more pooling, so that the higher grades are no longer available as such and the risk of human infection grows every month. The question instantly arises: What is going to be done about it? Is the Ministry of Food to risk sabotaging this valuable food by broadcasting to the public that all milk must be boiled? Such an act would do an enormous disservice to the community, and especially to the children. It would seriously affect both the consumption and the production of milk, and, if the warning and advice were acted upon, it would definitely lower the nutritive quality of the milk.

Lord Horder advocates pasteurisation as the logical short-term policy. The Government still hesitates, he said. Is it that machinery is not available? We release steel in enormous quantities for the destruction of life; why not release a little for its preservation? Or is it that the Minister of Agriculture fears he may offend the farmer-producer-retailer? And what is this special fear of the farmer-producer-retailer? What is his real grievance? Referring to the fear that pasteurisation would drive the "small man" out of business, Lord Horder asks why he should not take his milk to the nearest pool and exchange it for an equivalent of pasteurised milk. Alternatively, to sell it when he delivers it at a price which he would get "over the hedge" and hand over actual distribution to the larger concern. We pay many hundred millions a year in subsidising the nation's food; a few millions more paid to the small farmer-producer would be well spent if it enabled us to sterilise the nation's milk.

The Future Distribution of Food

Lord Horder concluded his address by asking how we can set the seal of permanence upon the fine piece of work which has been done during the stress of war and in a period of great necessity—the distribution of essential foods at a price every citizen can afford to pay. He thought that the answer lay in the setting up of a Nutrition or Food Council. The Government thought otherwise. Through its spokesman the Minister of Health it took the view that the work of such a council was already being done on the side of technical investigation and research by the Medical Research Council, the Agricultural Research Council and the Department of Scientific and Industrial Research, and in guiding the Ministries of Food and Agriculture with regard to production, import and distribution of foods by the Health Departments. Co-ordination of the policies of the various Ministries concerned was already achieved by appropriate inter-departmental machinery. So, continued Lord Horder, we are to have no perma-

nent organisation which shall see that we maintain an adequate standard of nutrition in this country. That is unless the people insist upon a machine being set up which will integrate and continue the knowledge and the administrative experience that have been accumulated with so much care and foresight under the sting of necessity.

Pending the building of some more authoritative machinery which will have for its object the production of the best food possible and its economic distribution, those who control the destinies of the Food Education Society will follow the British tradition and themselves forge a democratic instrument which shall, they trust, be of service in giving permanence to what has so far been done for the nutrition of the people.

MINISTRY OF FOOD

Zoning of Self-Raising Flour

THE Ministry of Food announces that an Amendment is being made to the Flour Order, 1943, which will, from May 30, "zone" the distribution of self-raising flour in the interests of transport economy.

The scheme covers self-raising flour, as defined in the Flour Order, 1943, only when packed in weights of 28 lbs. or less, and applies to flour millers, manufacturers, packers, wholesalers and multiple organisations, and to retailers in respect of their sales to catering establishments and institutions. It is based upon the division of the United Kingdom into ten zones, as described below, and upon the principle that a zone with a surplus of production as compared to consumptive demand shall not import any self-raising flour but shall direct its surplus production to the most suitable deficient zones. Similarly, deficient zones may not export self-raising flour outside their own boundaries and may only import from permitted surplus zones.

DESCRIPTION OF ZONES AND RESTRICTONS.

Zone.	*Food Divisions. Represents*	*May Export to Zone(s).*	*May Import from Zone(s).*
A.	Northern	G & J	Nil
B.	North-Western and North Wales ...	G, H & K	Nil
C.	South-Western ...	D & H	Nil
D.	South Wales ...	Nil	C
E.	London, E. 11 South-Eastern and Southern ...	H	Nil
F.	Eastern and North Midland	G	Nil
G.	North-Eastern ...	Nil	A, B & F
H.	Midland	Nil	B, C & E
J.	All Scotland ...	Nil	A
K.	Northern Ireland ...	Nil	B

The precise description of the counties comprised in each Food Division will be contained in the Statutory Order or may be ascertained in advance by application to Local Food Offices.

The scheme applies to all forms of transport, whether road (public or private hauliers), rail, inland waterway or coastal transport, and the Order will make it an offence to transport or consign for transport self-raising flour beyond the zone boundaries except as provided in the preceding paragraph. It should be noted that movements of self-raising flour are still subject to the terms of the Food (Sector Scheme) Directions, 1942, except that provisos (*a*) and (*b*) of Part II. of the Scheme will no longer apply. It will be essential for self-raising flour consigned after May 30 to be described on consignment notes as "pre-packed self-raising flour", this being the correct wording to describe self-raising flour packed for retail sale in units of 28 lbs. or less, whether or not such small units are contained in a larger outer container.

The present total production of self-raising flour is being maintained and no shortage is expected to be experienced. Wholesalers and retailers who may be affected by the scheme are asked to take the earliest opportunity of reviewing their channels of supply. Flour millers, manufacturers of self-raising flour and packers are reminded that the Ministry has no objection to arrangements being made by flour millers, manufacturers or packers for the packing of such flour in their own bags in the district in which it is to be consumed.

The Ministry is prepared to consider the issue of licences to meet any exceptional movements which may become necessary, and applications in such cases should be addressed to the Ministry of Food, Cereal Products Division, Bryn Euryn, Colwyn Bay.

Lecithin

LECITHIN, because of its colloidal nature and surface active properties, has found commercial application in many varied processes. Chocolate manufacturers were first to recognise the value of lecithin to reduce the amount of excessive cocoa butter required to give the coating the proper viscosity and are using large quantities. Being a natural product and non-toxic, it has gained rapid acceptance as an anti-oxidant in retarding the development of rancidity in edible fats and oils. In certain types of confections, lecithin is used as an emulsifying agent to properly incorporate fat into the batch which results in a product that has a better texture and is not greasy. Nutrition experts recognise the physiological significance of lecithin in the treatment of nervous disorders and in fat metabolism.

Bakers, faced with an Order limiting the amount of vegetable oils that may be used in the manufacture of shortening, are considering lecithin as a means of extending their shortening supply. Basically all bakery products consist of varying proportions of flour, shortening, liquid, leavening, salt and seasoning. Sweet goods contain in addition sugar, syrups and spices. Lecithin promotes the homogeneous blending of these ingredients so that equivalent shortening effect is obtained with a reduced amount. Generally speaking, one or two per cent. of lecithin added to shortening permits a reduction of from 15 to 25 per cent. of the amount of shortening normally required. Lecithin causes a lowering of the surface tension in the shortening and reduces the interfacial tension between the shortening and other ingredients of the formula.—*Baker's Digest.*

Maintenance of Beet Sugar Plant

C. H. S. TUPHOLME.

AN INDUSTRY of growing importance in this country is the manufacture of beet sugar. In this industry the range of equipment employed is exceedingly wide, and much of it is subjected to some very hard work. As a result, wear on many of the moving parts is excessive, and, unless an adequate stock of spares is carried, or the part can be easily repaired, not only is production delayed, but also a heavy stock of spare parts represents a disproportionate amount of sunk capital. It is here that the welding process, when intelligently used by a competent operator, can save not only time, but also money.

Conditions, of course, vary from factory to factory, and, whereas one works may have trouble with a particular part, another will have no apparent trouble. In fact, machines of the same type vary from works to works because component parts are removed or added to conform with individual ideas of improvement.

Treatment of Wearing Parts

All wearing parts, however, can be treated by welding so that a special hard face is deposited on the worn surface to obtain greatly increased service; and, when breakage occurs, the broken part can be repaired and put back into service in the minimum of time.

For example, the wearing parts on pilers can be hard-surfaced with a special bronze welding rod if oxy-acetylene welding is used, or with one of the special alloy electrodes if the electric arc process is employed. In the trash catcher the chain lugs and the sprockets soon become worn, and these, too, can be resurfaced. Parts so treated not only last much longer than the original metal, but they can also be rebuilt almost indefinitely. In addition, the gas blowpipe or electric arc can be used in the making of the hooks from steel bar stock.

The sand traps used vary in type, though they are generally of two main kinds. In one, employing a deepened section of flume with a grating cover, this grating can often be made and also repaired by a welder. In the other type, employing pulsating pistons for agitation, the eccentric straps can be rebuilt by welding when worn, the impeller tips can be hard-surfaced, and the pump shaft can be hard-faced to reduce wear in the packing glands.

Means of lifting the beet to the washer vary, and may be a scroll, wheel, or air lift. If a scroll is used, the centre bearings can be hard-faced; in the case of a wheel the worn gear teeth on the buckets can be rebuilt with a wear-resisting alloy, and will give much longer life than the original cast iron.

The paddles or washer arms in the beet washer can be both made and repaired by welding, and some factories have prevented breakage by welding a reinforcing member on the back of each arm near the hub.

In the case of the roller picking tables, the rolls can be fabricated from 6-in. diameter pipe with burrs or small knots welded on to make them rough. A roll so made is, in fact, superior to the one made by the older method of drilling holes and inserting rivets for burrs, because the water cannot work around the welded burrs to start corrosion.

Beet Elevators

Beet elevators are generally of two kinds. In one, two endless chains carrying buckets run over sprocket wheels top and bottom. In the other a single chain is used which runs over a flanged wheel. As these chains run in water at the bottom, it is not practicable to lubricate them, and the parts wear considerably. All these worn parts can be rebuilt with wear-resisting electrodes, particularly the sprockets, bucket lugs, links and pins, with results equal to or better than the life of the original parts.

Elevator ratchet pawls can be hard-faced with advantage, and the hard-facing material is not affected by the chemical action of the beet water. Elevator buckets can be fabricated by welding, and such buckets are lighter and stronger than those made by other methods. In some cases the bucket ears are welded to the link belt chain lugs to prevent moving on the bucket lug-bolts.

In beet scales there is almost inevitably heavy wear on the knife edges and vee blocks, and if these parts are hard-surfaced they should have a life of at least two years before they require attention again.

Slicing machines are commonly of two types, having either horizontally rotating or vertically rotating knives. In one case the main casting of one of these machines was built up, where worn, with wear-resisting alloy, and has worked without interruption for three years. In another case slicer drums are regularly rebuilt, and the knife blocks and rocker bars are also surfaced when worn. Eccentric straps for this type of machine can also be rebuilt in the same way.

Cossette Conveyors

Cossette conveyors are generally of either the belt or drag type. The drag is composed of endless chains with cross-bars and fingers which drag the cossettes along a chute. These chains run over sprockets and are carried along a track by lugs on the chains. The lugs wear rapidly, and it is good practice to surface them with wear-resisting alloy.

The cossettes are dumped in one of the cells of the diffusion battery, which is composed of large upright cast-iron cells with doors both top and bottom. When each charge is finished a battery tender using a bar removes the exhausted pump from the cell. In this operation the door-jambs become worn and are rebuilt by welding. Inlet necks, when corroded, are repaired with alloy electrodes. Four-way stop-cock valves, bodies and cores are built up by welding and machined, with a considerable saving over the cost of new bodies and cores. Brake wheels are welded with alloy electrodes when broken and worn top door lugs are built up in the same way. Plates on door latches subject to wear have been hard-faced with very satisfactory results.

In the carbonation and filtration processes it is a growing practice to weld the various tanks, pipes and other equipment. Cooling systems for sulphur stoves can also be fabricated from pipe.

Filtration Plant

Filters of various types are in use. Frames for some of these are successfully welded. Juice spouts are in some cases made of pipe welded direct to the frame, and in others the pipe is welded to a flange which bolts to the frame. In one factory a filter press yoke broke and was quickly welded. This yoke has withstood a load of about 50 tons regularly ever since.

Valve seats on another type of filter press have been made of steel and hard-surfaced with great economy, showing no wear since, which is a great improvement over ordinary seats. Paddles in another type of filter press are hard-surfaced, and in still a fourth type vacuum head pins are built up with hard alloy when worn.

When the filter screen tubes become worn to the point where there is danger of collapsing, the screen is cut from the head with a cutting blowpipe and reinforcing rings are welded inside to strengthen the tube. These rings are spaced about 20 in. apart, and a welded jig is used to place them in perfect alignment. The tube is then rewelded to the head.

Vacuum Pans

A number of evaporator castings have been repaired by welding, and some factories have effected a saving by renewing tips on the tubes with alloy electrodes.

Wear on coils in the vacuum pan is caused by expansion and contraction due to frequent temperature changes. This condition also makes flanged coils difficult to keep tight. Steam headers for the coils, fabricated by welding, are more compact and cheaper than mechanically fabricated headers. One factory has welded all copper coil joints inside the pan to eliminate leakage, and reports very satisfactory results. Coils, when worn by supporting members, are patched by welding, and one factory half-soled a set of new coils at the point where they became worn.

Hard-surfacing material is used on centrifugal machine toggle arms and clutch yoke fingers with excellent results, such parts showing no wear even after two years of service. These parts formerly gave a great deal of trouble by wearing in a very short while, so that they would not function properly. Sugar discharger heads, discharger ploughs, eccentric straps and pulley hubs are built up with alloy electrodes when worn, and discharger ploughs are welded when broken.

Gudgeon pins and thrust buttons on the sugar scrolls are hard-faced with very satisfactory results. Steel pins not only wear extremely, but also wear the cast-iron bearing caps through, sometimes in one campaign, whereas hard-surfaced steel pins do not show any wear and the bearing cap is only slightly worn after a campaign. These bearings cannot be lubricated. Broken parts on elevators and driers can also be welded.

Water Jackets and Pumps

In one plant water jackets were placed entirely around the crystalliser tanks by means of welding. In another factory it became necessary to lower a number of these machines to make room for more equipment. The cast-iron supporting members were cut with a cutting blowpipe to the desired length and rewelded, effecting a great saving over any other method by which the work could have been done. Broken gears are also welded.

There are dozens of pumps of various types, sizes, and makes in a sugar factory. Pistons, piston rods and valves for piston pumps are all being very successfully rebuilt and reclaimed by welding at a great saving. In centrifugal pumps, impellers, impeller seal-ring seats, shafts, bowls, heads, etc., are all being economically reclaimed by welding.

Where sleeves cannot be used, any difficulty experienced in straightening the shaft after hard-surfacing can be overcome in this way. The wear-resisting material should always be put on in a spiral fashion, whether on a sleeve or directly on a shaft. This eliminates distortion. This hard-facing material is also successfully used on seal rings and seats and on impellers by some factories. In one case a hard-surfaced shaft worked for 165 days, as compared with 30 days for steel under like conditions.

Piping Repair

There are many miles of piping in each factory, with all kinds of fittings. All pipings can be completely welded, with a great saving in installation cost. Valve flanges on acid lines have been bored out and welding electrode applied for new threads, hard alloy also being applied to the face of the flange.

Miscellaneous applications consist of all kinds of broken castings, mostly welded; cable drums built up with alloy electrode; worn cast-iron eccentrics and straps faced with alloy; radiators fabricated by welding; pipe flanges cut from steel plate; bearing pedestals fabricated completely by welding.

Clam shell lips on cranes are hard-surfaced, as are orange-peel bucket points, with a great increase in life of these parts. Hoppers and chutes are completely fabricated by welding. The cutting blowpipe is used for innumerable cutting jobs, which effects a saving over methods previously employed.

BOOKS RECEIVED

Food and Farming in Post-War Europe. By P. Lamartine Yates and D. Warriner.

Domestic Preservation of Fruit and Vegetables. Ministry of Agriculture Bulletin No. 21.

Canned Foods, An Introduction to their Microbiology. By J. G. Baumgartner.

Tractor versus U-Boat. By D. N. McHardy, N.D.A., A.I.A.E., M.S.E.

Planning of Science. Report of Conference organised by The Association of Scientific Workers.

Addresses and Messages of Franklin D. Roosevelt. U.S.A. Official Document.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

News from the Industry

Food Minister and Biscuit Alliance

The Minister of Food has relinquished his voting powers on the committee of the Cake and Biscuit Manufacturers' War-Time Alliance, but retained the right of veto at a general meeting of members of the Alliance.

This was disclosed in the House of Commons recently by Mr. Mabane, Parliamentary Secretary to the Ministry of Food, who said that the articles of association of the Alliance were now in course of revision, with the object of giving effect to this and other changes.

The articles at present provide that the Minister shall have a number of votes exceeding by one the total number of votes which could be cast by all others entitled to vote.

* * *

Salvaging Beeswax

Beekeepers are urged to salvage all beeswax, render it into clean cakes, free from dross, and send it, either through their associations or direct, to the manufacturers of comb foundation. This does not, of course, apply to wax from hives known to be infected with disease, which should be burnt.

Failing substantial quantities being secured in this way, beekeepers may find it impossible to obtain sufficient supplies of comb foundation in future.

* * *

Sugar for Soft Drinks

To facilitate the arrangements for the concentration of the soft drinks industry, the Ministry of Food has decided that the issue of sugar permits for the manufacture of soft drinks shall be progressively centralised in the Allocations Control, Douglas Hotel, Colwyn Bay.

For the time being, no change will be made in the allocations of sugar to makers of lemonade and fruit drink powders and crystals, who will continue to receive their allocations from the Control or from Food Offices at the rate of 20 per cent. of their basic usage.

Self-Raising Flour Zoning

The Ministry of Food announced that the operation of the self-raising flour zoning scheme was postponed from May 30 to June 13.

Following representations made by certain wholesale associations, the Statutory Order, which will shortly be published, will now provide that pre-packed self-raising flour is entirely freed from the restrictions previously imposed by the Food (Sector Scheme) Directions.

* * *

Licences to Buy Apple Pulp

The Ministry of Food reminds manufacturing confectioners, catering establishments and institutions holding licences under the Fruit Pulp (Control and Maximum Prices) Order, 1942, to buy apple pulp from licensed preservers, that these licences expired on June 1, 1943. Any licensee wishing to obtain a further licence should return the existing licence and apply for its extension to the Catering Division, Ministry of Food, Mount Stewart, Colwyn Bay.

* * *

Soya in Sausages

It is desired to correct any misunderstanding which may have been caused by statements in certain sections of the Press that sausages would shortly cease to contain bread, and, in other sections, that soya flour would be used, states the Ministry of Food.

Beef and pork sausages and sausage meat will in the near future be required to contain 37½ per cent. meat. The present standard permits a meat content as low as 30 per cent. and as high as 45 per cent. In addition, 7½ per cent. low fat soya will be required to be included. The remaining 55 per cent. will consist of cereal filler in the form of rusk or bread with the necessary moisture.

The low fat soya is a special product and should not be confused with the soya flour known to the housewife which, having the full natural fat content, does not lend itself to use in sausages.

Damaged Butter and Cheese Agent

The Ministry of Food announces that the address of W. H. Tutton and Co., Ltd., for consignments of damaged butter and cheese has been changed. The new address is: W. H. Tutton and Co., Ltd., Belgrave Buildings, Gibson Place, Carnarvon Street, Cheetham, Manchester 4.

* * *

"More Milk" Awards

Diplomas are to be awarded by the Minister of Agriculture in recognition of the great achievements in milk production attained on thousands of our farms during the first year of the "Victory Churn" Contest. An increase of 20 per cent. or more in milk sales in the period April 1, 1942, to March 31, 1943, compared with sales for the previous year, earns a red diploma, and sales that have increased 10 per cent. or more entitle a farm to a blue diploma.

Each diploma will cite the name of the actual farm on which the increased production has been achieved, and be awarded to "the farmer and farmworkers" of that farm in recognition of their loyal service.

* * *

Workers from Wholesale Fish Trade

As part of the man-power contribution to be made by the food distributive trade during 1943 towards the fighting Services and vital war industries, 1 in 8 of the total workers engaged in the wholesale fish trade, including administrative, supervisory and clerical staffs, are to be withdrawn.

The proportion to be withdrawn will vary in different markets and ports and in different firms, states the Ministry of Food. Unless there are special circumstances the younger men and younger women will be withdrawn first. Those to be withdrawn will be given the opportunity of representing that their withdrawal will involve exceptional hardship to themselves or to their employers.

Sales of Edible Oils

The Minister of Food has revoked the Dripping and Edible Oils (Control of Sales) Order, 1942, and made a new Order controlling the sale of oils and fats to trade users. The effect of this new Order is that all oils and fats (other than suet, peanut paste and peanut butter) suitable for use in the manufacture or preparation of human food may only be bought by, or sold to, a trade user under the authority of a permit issued by the Ministry. The new Order, which will be known as the Edible Oils and Fats (Control of Sales) Order, 1943, came into force on May 24, 1943.

* * *

Industrial Fires

The great damage to the country's war effort now being done by avoidable fires in factories and other industrial buildings was a point urgently stressed by Sir Stafford Cripps, Minister of Aircraft Production, when he addressed 5,000 workers in a north-western aircraft factory recently.

"I think some of us do not realise," said the Minister, "the enormous wastage both of effort and material that arises from constant fires that are occurring in our factories at this time of the war.

"There are to-day something like 1,000 fires a day occurring, not all of them in our factories or industrial units, but a great many of them are in these units, and the majority are caused by carelessness of individuals."

Commenting on Sir Stafford's appeal, one authority on industrial production confirmed it as his experience that the great majority of fires involving factories, mills, warehouses, wharfs, and so on are, in fact, caused by thoughtless or careless actions on the part of individuals, and included a high proportion due directly or indirectly to dropping lighted cigarette ends and matches.

Of the remainder, he believed, many could be prevented by the wider use of adequate fire prevention equipment, especially sprinkler installations.

Supplies of Lard

The Ministry of Food announces that it is compelled to restrict the delivery of lard to retailers only.

Trade users and other large-scale buyers will receive compound cooking fat instead of lard.

* * *

Industrial Salvage Groups

An interesting new development is being promoted by the Directorate of Salvage and Recovery, Ministry of Supply. The scheme aims at the appointment by each industrial works of a salvage officer, who may be either part-time or whole-time, to stimulate and organise the maximum recovery of salvage in each works or department of the works. Leaflets for the guidance of such salvage officers are provided by the Ministry and, if desired, a limited number of posters will also be supplied.

Industrial Salvage Groups are being formed consisting of the salvage officers of the works in any given locality. These Groups elect their own honorary secretary and arrange occasional meeting of their members to exchange information and ideas and to discuss any problems of disposal or treatment of salvaged materials. On such problems the Directorate of Salvage and Recovery, Ministry of Supply, is glad to assist, and will, where necessary, undertake special investigation and research.

This plan serves a valuable two-fold purpose; it arouses among the employees an active interest in promoting the salvage of the odds and ends and waste material that arise in the course of their work, and it enlists the combined experience and technical knowledge of specialists in solving problems relating to the best economic use of difficult materials.

Although the plan was launched only recently, over 120 district Groups have already been formed, with a membership of about 3,000 firms, and many other Groups are in process of formation. Firms interested are invited to communicate with the Directorate of Salvage and Recovery (Industrial), Berkeley Court, Glentworth Street, N.W.1, or with the Department's Regional Recovery Officer for the district.

Maximum Prices of Dripping

The Ministry of Food announces that the Dripping (Maximum Prices) Order, 1940, has been revoked as from May 30, 1943, and that a new Order, which came into force on that date, has been made fixing maximum prices for dripping as follows:

On a sale by a manufacturer to a wholesaler, 58s. 4d. per cwt.
On a sale by wholesale, 63s. 4d. per cwt.
On a sale by retail, 8d. per lb.

Under the new Order sales of dripping to trade users are sales by wholesale.

* * *

Cheese Averages

The following average loss allowances operated in respect of all cheese covered by delivery orders issued by B.A.C.A.L. on behalf of the Ministry dated on and after May 22, 1943:

Australia ...	3½	per cent.
Canada ...	3	,, ,,
New Zealand	4½	,, ,,
U.S.A. ...	2½	,, ,,

* * *

Use of Saccharin in Food Manufacture

The Minister of Food has issued a General Licence under the Saccharin (Control and Maximum Prices) Order, 1942, authorising manufacturers to use, until July 24, for the manufacture or preparation of food any stocks of saccharin solution, dulcin solution, saccharin in powder form, dulcin, soluble saccharin or sweetening powder of which delivery was taken on or before May 29.

* * *

Waste

The package of a well-known household cleanser came into our hands recently. It was made of heavy cardboard with tin ends and its contents only occupied two-thirds of its total capacity.

This led us to examine a number of war-time packs, and we find the practice of making the containers too large for the contents is common. This is a waste which should stop.

Food Rationing Advisory Committee

Sir John Anderson said in the House of Commons recently that the Food Rationing (Special Diets) Advisory Committee of the Medical Research Council had held fourteen full meetings in all. Owing to the decrease in the number of questions referred to the committee, and particularly of questions involving new principles, it had not so far been necessary to convene a full meeting in 1943, although a subcommittee met. Minor questions arising between meetings were circulated in the form of memoranda and the opinions of members obtained in writing. The other bodies consulted on behalf of the committee since the beginning of this year, in addition to Government Departments specially concerned, were the Royal College of Obstetricians and Gynæcologists, the Joint Tuberculosis Council, and the Tuberculosis Association.

* * *

Changes in Divisional Food Organisation

The Minister of Food has approved the following changes in the Divisional Food Organisation:

Mr. R. H. Beckett, C.S.I., C.I.E., who has rendered valuable service to the Ministry as Divisional Food Officer, South-Western Division, has found it necessary to resign his appointment on account of private affairs.

Paymaster Rear-Admiral Sir Arthur F. Strickland, K.C.B., O.B.E., Chief Divisional Food Officer, Southern and South-West England, has accepted the appointment vacated by Mr. Beckett, and, in addition, will continue to carry on his duties as Chief Divisional Food Officer.

* * *

Saccharin: Use in Manufacture

The Minister of Food has amended the Saccharin (Control and Maximum Prices) Order, 1942, so as to prohibit the use of saccharin tablets and sweetening tablets in the manufacture of any product, and the use of other forms of saccharin and dulcin in manufactured foods. An exception is made of the use of saccharin powder, soluble saccharin and saccharin solution in soft drinks. The raw materials for the manufacture of saccharin and dulcin are in short supply, and the purpose of these amendments is to ensure that the limited supplies of tablets are used for domestic purposes; that, with minor exceptions, saccharin is used only for making tablets, soft drinks and pharmaceutical products; and that dulcin is used only for making tablets and non-food products.

These provisions came into effect on May 30, 1943.

The Order also requires manufacturers of saccharin, soluble saccharin, and dulcin to be licensed, and prohibits purchase or sale by wholesale of saccharin and dulcin in powder form or in solution except against permits. These provisions will operate from July 25, 1943. Exception from the permit machinery is provided where saccharin powder, soluble saccharin or saccharin solution is obtained or supplied for pharmaceutical purposes.

* * *

Control of Typewriters

The sale or hire of all typewriters, except secondhand portable machines weighing less than 22 lbs., were controlled as from May 13, 1943. Since that date no dealer or private individual may dispose of or acquire a typewriter without a licence. Special permission will also be required before any machines may be broken up.

Dealers may obtain a general permit enabling them to acquire machines without an individual licence in each case, but they will still require individual licences in order to dispose of the typewriters.

All applications for licences should be addressed to the Directorate of Office Machinery, Hawkins House, Dolphin Square, S.W. 1.

The restrictions imposed under the Order—known as the Supply of Typewriters (Restriction) Order, 1943 (S.R. & O. 1943 No. 676)—bring the practice in this country into line with that of the U.S.A. and nearly all the Dominions and Colonies where systems of control have been instituted already. The restrictions are necessitated by the heavy demands of the fighting Services and Government factories, demands which absorb nearly four-fifths of our present output, while the shortage has been accentuated still more by the curtailment of manufacturing consequent upon the partial or complete conversion of typewriter factories to the production of munitions. Before the war about 60 per cent. of the typewriters sold in this country were imported, but to conserve shipping space and dollars these imports were stopped three years ago. Since then the supplies of available standard machines have been steadily decreasing, and it has now become necessary to ensure as far as possible that they are used only on essential work.

* * *

Canning in Australia

Australia is already producing over 1,000,000 cans of Australian-grown vegetables a week for the services, or 10 times the pre-war output.

Relatively new crops never canned before are sweet corn and navy beans and peas. The last-named are the best of many army rations and the component of canned pork and beans. Australian vegetable canners, only one or two of whom have previously been in business, learned from American experts in a year all that the United States discovered in 25 years of experience, including the canning of vegetables and citrus juices. Advice has also been given in canning meat.—*The Times.*

* * *

New Australian Food Controller

Mr. J. F. Murphy, Secretary of the Department of Commerce and Agriculture, has been appointed Commonwealth Food Controller. The appointment is an attempt to overcome difficulties by the Departments of Commerce and Supply. The principal effect is to transfer the administration of defence food supplies from the Department of Supply to Commerce, which was previously concerned only with civilian food supplies. Mr. Murphy will be responsible for supplies to the services, allied forces, civilians, and men oversea. The Minister of Commerce and Agriculture, Mr. Scully, will become chairman of the food executive and the Australian Food Council.

Licensing of Manufacture of Meat Extracts, Dried Soups, etc.

The Minister of Food has made an Order under the Manufactured and Pre-Packed Foods (Control) Order, 1942, and appointed May 18, 1943, as the date on which it became obligatory upon manufacturers of meat, vegetable, yeast and malt extracts and similar foods and also of dried soup mixtures and gravy preparations to hold licences. Returns submitted in accordance with Article 2 of the Principal Order will automatically serve as applications for such licences. Manufacturers who have failed to submit such returns should make immediate special application for licences to the Ministry of Food, St. John's College, Oxford.

From August 24, 1943, it will be an offence for any person to sell any of the above products unless it has been manufactured or prepacked in accordance with the terms of a licence granted under this Order.

* * *

Irish Moss in Canada

The annual report of the Provincial Department of Agriculture for the fiscal year ended December 31, 1942, notes that: "A great amount of work has taken place during the year in connexion with Irish Moss. This industry has developed into very considerable proportions and, according to latest statistics, the following quantities have been gathered and shipped from Prince Edward Island: In 1941, 209,000 lbs.; in 1942, 1,483,165 lbs."

* * *

Canadian Concentrated Milk

The manufacture of concentrated whole milk and by-products in the month of March totalled 17,925,979 lbs., compared with 10,844,099 lbs. in the preceding month and 17,467,311 lbs. in March, 1942, thus recording an increase of 65 per cent. over February and an increase of 2½ per cent. over March, 1942. For the three months ended March 31 of the present year the production of concentrated milk (whole milk and by-products) amounted to 40,921,030 lbs., compared with 39,932,510 lbs. in the corresponding period of 1942.

OBITER DICTA

● Flaps, including dogfish flaps, are lugs or belly walls.—*Mr. Mabane, in reply to a question in the House of Commons, May 12.*

● I wish to say that the fruit is in the jam.—*Mr. Mabane in the House of Commons.*

● It is watered down and gelatine is put in to thicken it.—*Mrs. Hardie, M.P. (Soc.), in reply to the above.*

● On oatmeal the Scots drove out Angles, Danes and Norse. Bannocks were the Scottish rations at Bannockburn!—*"Glasgow Evening News."*

● The Ministry of Food said testily: "Of course it is all right to eat pork at this time of the year. We should not put it on the market if it weren't."—*"Sunday Pictorial."*

● If we are going to have co-operative advertising, for goodness' sake let's have it! Let us have it in spirit and in truth and not just as a technical achievement.—*P. J. Allen, in "The Newspaper World".*

● The imposition of conditions of sale are rampant in the wholesale trade. It should be investigated by the Ministry of Food.—*Member of Lewisham Food Committee.*

● In my opinion, the responsibilities put upon company directors by the Government in our particular trade are such that they are in many cases intolerable and grossly unfair.—*Mr. Thomas W. Burks, Chairman of T. Seymour Mead and Co., the Manchester grocery firm.*

● The men who work at cold stores swear they have a certain cure for hay-fever and colds.—*D. N. K. Bagnall, in the "Daily Mirror".*

● What the public wants is fish in variety, not the eternal coarse kind, which they are heartily sick of, short as supplies may have been. Where are the halibut, hake, plaice, megrims and other kinds that used to be here at all times, except during the ordinary seasonal shortages? Just food for the "black marketeers", who are being encouraged.—*F. Hazledine, in the "Birmingham Evening Dispatch".*

Wage Increase for Fishermen

Agreement has been reached in the wages negotiations which have been proceeding in London between the British Trawl-owners' Federation and the Transport and General Workers' Union. At the East Coast ports and at Fleetwood, where the fishermen are paid on the net proceeds of the voyage, the increase in their weekly pay under the new agreement will be 24s., and for each member of the crew, except the skipper and the mate, the poundage rate is increased by approximately 25 per cent.

The new agreement was brought into force on June 12 simultaneously with the Order fixing the maximum summer fish prices.

* * *

Exports from Madagascar

A plan to facilitate the revival of economic relations between Madagascar and the Allied Nations and to ensure the maximum participation in the war effort of all the resources of Madagascar is announced.

The French National Committee has agreed with the Governments of the United Kingdom and the United States that, until further notice, the surplus available for export to the Allied countries of specified foodstuffs and raw materials will be purchased through Allied Government agencies at prices to be mutually agreed upon and allocated in accordance with the needs of the Allied Nations by the combined Food Board and the combined Raw Materials Board. Other commodities will be available for purchase through normal trade channels.

The foodstuffs and raw materials specified are:

Frozen meat, canned meat, lard, tallow, blood meal, meat meal, bone meal, liver meal, tripe cracklings, oil cake, rice bran, maize, manioc root, manioc flour and starch, tapioca, rice, pois du cap (all grades), haricot and other beans, copra, ground nuts, castor oil and seeds, other oil seeds, sugar, cocoa, coffee (up to 7,500 tons), cinnamon bark, pepper, hoof meal, horn meal, bristles, hides, rubber, rubber seed, raffia, kapok, sisal, hemp piassava, other fibres, beeswax, rock crystal, beryllium, ore corundum, phosphates, mica, graphite garne, grey agate, columbite ore, coconut, charcoal, pyrethrum, guano and tung oil.

Mechanical Stoking

As an aid to efficiency and economy in boiler operations, mechanical stoking has definitely proved its value.

James Hodgkinson (Salford), Ltd., are the original patentees of the Overfeed Coking Stoker with an actual self-cleaning grate. It has been designed to burn the widest possible range of fuels, with simplicity of operation. When once the machine is set to work the fire doors need never be opened again as long as the boiler is at work; manual labour is accordingly reduced to a minimum, the only work entailed being the removal of incombustible residue from the ash pits.

Freedom from smoke and grit emission from the chimney when employing this stoker is also a definite advantage in factories where cleanliness is essential.

In view of the urgent need to save coal, special arrangements to give quick delivery of equipment have been made. Furthermore, if any firm desires a survey made of their boiler plant by a competent combustion engineer, followed by a report embodying recommendations, this can be arranged without charge.

* * *

Alcohol from Wheat

Industrial alcohol has been produced from wheat in Canada for six months, and it is expected that by the end of July nearly 4,500,000 bushels of wheat will have been utilised. In the whole of 1943 the amount of wheat used is estimated to reach between 6,500,000 and 7,500,000 bushels.—*Reuter.*

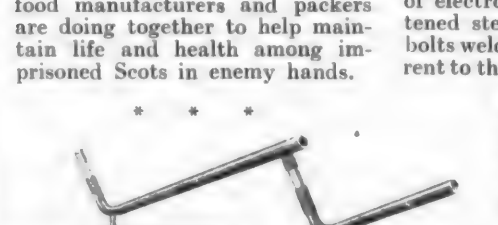
Food Parcels for Scots Prisoners of War

The excellent work being done by packed goods sent by the Red Cross and packed in Scottish centres, for prisoners of war abroad, has been repeatedly mentioned by prisoners writing home. In Edinburgh this has become a major war effort for over 140 volunteer workers who are operating the most unusual food packing depôt in the country. Although the work is voluntary, it is organised on factory lines, and has enlisted many housewives and business men. There are two shifts daily, from 10 a.m. to 12.45 p.m. and from 2 p.m. to 5 p.m. The work has been systematised by men engaged in the packaging industry and is thoroughly and efficiently done, except that staff shortages are apparent here, as in other factories.

In almost every case the goods are packed in plain board or tin containers without labelling. When packed, the boxes are taken by trolley to the sealers who put on the lids, and then to the dispatchers who tie them and stack them for dispatch.

The invaluable work being done in this and other packing centres is adequate testimony in a small way to the big job which food manufacturers and packers are doing together to help maintain life and health among imprisoned Scots in enemy hands.

* * *



Modern Lighting Installations

In view of the giant strides which are being made in modern lighting installations so as to promote efficiency in industry and thus increase the nation's war output, Crompton Parkinson, Limited, have issued an up-to-date edition of their D.1015 broadsheet. This gives details and prices of general service electric lamps, automobile lamps, electric discharge lamps, chokes, starting equipment and reflectors.

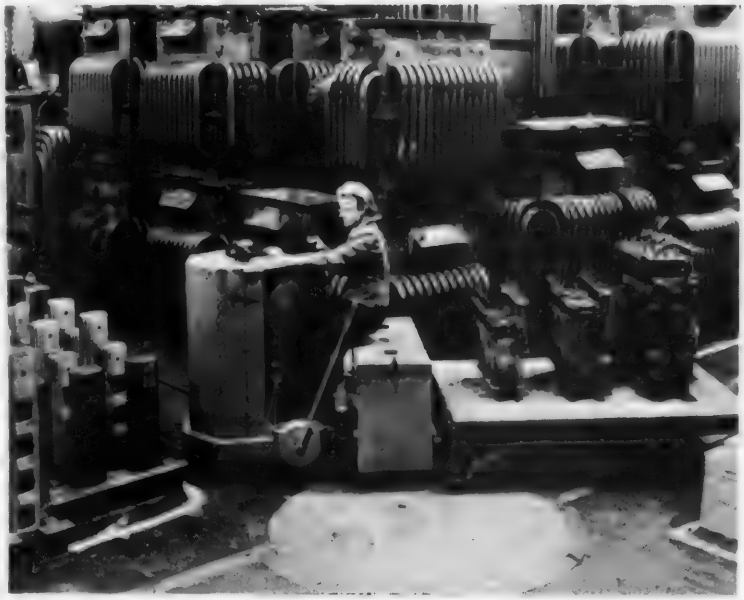
* * *

Electrolysing Water

There are several methods of producing hydrogen commercially, and one of the cleanest and least troublesome is by the electrolysis of water, which produces gas of very high purity, 99·95 per cent. and over, and also gives simultaneously the important by-product, oxygen.

The International Electrolytic Plant Co., Ltd., manufacture the "Knowles" cells for electrolysing water, ranging from small sizes producing 8 cubic feet of hydrogen per hour, to ones giving 164 cubic feet per hour, with 10,000 ampere loading. All cells are of steel construction, and can be easily erected and dismantled as no large joints are used in their construction. The standard types of electrodes are made from flattened steel sheets with pure iron bolts welded on for leading the current to them. An improved type of electrode with copper leads has been developed and marketed, enabling twice the current to be passed, thus doubling the output of gas without otherwise modifying the construction or size of the cell.

The plant, which consists of a number of cells in series, is also equipped with special apparatus continuously to feed the cells to their correct level with distilled water, wash the gases, and maintain an equal gas pressure on either side of the cell diaphragms, so preventing any possibility of the hydrogen and oxygen mixing.



Electric Industrial Truck

An electrically driven truck is described and illustrated in Pub. No. A201 of the Brush Electrical Engineering Co., Ltd. It is of 2-ton carrying capacity. Releasing fuel that is required for the more important aspects of the war effort, electric drive also ensures the speedy handling of goods by a twenty-four hour service with the minimum maintenance and low operating cost.

Some of the operational features are: The truck is easily turned in a circle with a radius of just over its overall length; the elevating gear enables loaded stillages to be picked up in 15 seconds—when the load is ready there is no waiting time and the truck is continuously on the move; narrow gangways are easily negotiated and, finally, the truck can handle 8 to 10 times the material manhandled.

* * *

Carving the Cow

The U.S. Office of Price Administration has published a 24-page booklet of instructions to wholesale butchers for cutting up a side of beef. The book, which is written in highly technical language, speaks of the cow's "thoracic vertebra", "lumbar section" and "chine bone". Senator Butler, of Nebraska, commented: "The whole thing's nutty".—*Reuter.*

Morton Machine Co., Ltd.

Morton Machine Co., Ltd., have secured larger and more convenient premises for their London offices at Decca House, a building some fifty yards away from the old premises.

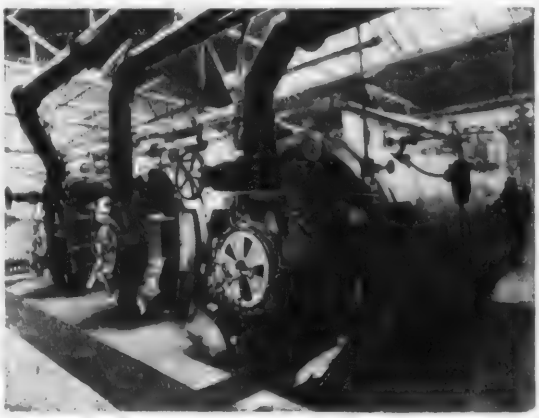
The postal address remains the same: 1, Brixton Road, Kennington, S.W.9. Telephone number: Reliance 3609.

* * *

Smith's Potato Crisps

Smith's Potato Crisps (1929) is maintaining the total distribution for the year to March 31 at 32½ per cent. by a final dividend of 20 per cent. and a bonus of 5 per cent.

* * *



Electron Diffraction

The thirty-third annual May lecture of the Institute of Metals was delivered on May 19, 1943, by Professor G. P. Thomson, D.Sc., F.R.S., entitled "Electron Diffraction".

* * *

Mr. A. G. Clausen

Mr. A. G. Clausen, who was for many years associated with the late Mr. Hal Williams, is continuing in practice as a consulting engineer at 61, Carlton Hill, N.W.8, specialising in refrigeration and its applications, in abattoir and by-product work and in the equipment of food factories.

* * *

Gas Firing for Boilers

The firing of steam or hot-water boilers and other equipment, such as brewers' "coppers", by gas is in many cases a convenient and efficient method, depending, of course, upon the local conditions as regards supply and the price of coal, coke, and gas. Interest attaches in this connexion to the range of "Gako" turbulent burners supplied by Liptak Furnace Arches, Ltd.

Essentially they consist of separate and independent valve control of the gas and air supply, which are also split up in the burner into a number of independent thin layers or streams, each of which is given a twisting or whirling motion by means of spiral guides or passages. The result is an extremely intimate mixing of the gas and the air, with rapid completion of the combustion, giving a short globular flame with high CO_2 and little excess air. Another feature is that the operation is under low-pressure conditions, generally 2-4 in. w.g. which eliminates all "stratification", that is non-uniform furnace temperature, which is apt to be one of the inherent troubles of high-pressure burner operation.

Future of Milk Pasteurisation

Since the Ministry of Health gave legal recognition to the H.T.S.T. system of milk pasteurisation many patents have been registered in connexion with this process. The relative efficiency of the H.T.S.T. and "Holder" processes is still a subject of controversy. In favour of the former a dairy engineer who has recently introduced a new H.T.S.T. plant asserts that on nearly every point, financial and material, this system permits of economies over the "Holder" process. The capital cost is about half that of a "Holder" plant of the same capacity. The approximate time for processing 1,000 gallons of milk with the new plant is 4½ hours, compared with 5¼ hours by the "Holder" method; there is an economy of 25 per cent. in the gallonage of cooling water required; and saving is also effected in fuel consumption.

The engineer estimates that the total saving in running costs and depreciation is between 30 and 40 per cent. compared with the "Holder" process.

* * *

Boiler Setters' Association

A meeting of the principal firms engaged in the trades of boiler setting, chimney and furnace construction, was held in London recently when it was decided to form an Association representative of the trade throughout the country.

The objects of the Association are to establish relations with the Ministry of Works and other appropriate Ministries in order that the conditions under which the industry may best serve the public interest may be determined, and to work out a scheme of mutual assistance and co-operation to ensure that the effects of shortage of man power may be minimised and the maximum output obtained.

The new Association will be known as the "Association of Boiler Setters, Chimney and Furnace Constructors". The chairman is Mr. P. A. Evans of Messrs. W. Neil and Co., Ltd. The secretary is Mr. A. P. Hughes. The offices of the Association are at The Outer Temple, 222, Strand, London, W.C. 2.

Weight and Health

A double check on the nation's health is being made by the addition of a Ministry of Food "weight" survey to the blood tests for nutrition already announced by the Ministry of Health. The blood tests are being made on volunteers from all sections of the community.

The Ministry of Food's investigation relates in particular to the housewife and to the employees of small firms, neither of whom come automatically under welfare supervision. A suggestion is to be considered that the single person living alone should also be included as a likely sufferer from food deficiencies.

Volunteers sought by the haphazard method of the pin and the directory will be asked to accept a card with spaces for weight, height, and age, and to be weighed every quarter by one of the chemists whose names are listed on the back of the form. Results will be sent to the Food Ministry for the information of its scientists.

Preliminary tests are already being made in the London boroughs of Ilford and Hackney and in Northampton, and the survey will eventually extend throughout the country.

* * *

War Savings Scheme

Food manufacturers, distributors and caterers in Hammersmith are playing a big part in a scheme which is raising the Borough's national savings to a new high level.

This scheme is called "The Bob in the Pound League"—saving of one shilling in every net pound earned is the target—but not the "bull's-eye". Top places in the League are reached by the firms whose employees save the highest amount.

The results in the first round—December 18 to March 27—have already shown remarkable increases in the savings achieved by the workers in the following firms:

W. Crawford and Sons, Ltd. (winners of the Northern senior section of the League with the best rate of savings in the Borough); United Dairies (London), Ltd.; Skuse and Co., Ltd.; London Wholesale Dairies, Ltd.; L. E. Jolly, Ltd.; J. Lyons and Co., Ltd.; Vitamins, Ltd.; Fuller's, Ltd.; Clarendon Catering Co.

Lord Kindersley, President of the National Savings Committee, visited Hammersmith in May to present the trophies to the winners of the first round, and to congratulate the National Savings Industrial Committee of Hammersmith on having originated their Bob in the Pound League, and having so thoroughly organised it. He added: "A striking fact that has emerged from reports covering the savings campaign in industry is the excellent effect the establishment of Savings Groups has upon industry as a whole. Almost without exception records show that where the standard of saving is high, production is correspondingly good. The reason is not far to seek. Interest in savings must carry with it interest in the war effort as a whole."

A comprehensive account of the working of the "Bob in the Pound League", with specimens of the introductory letters, entry form, bulletins and posters, will be sent to any industrial group interested, on application to the Hammersmith Town Hall.

* * *

New Book on Food Poisoning

Food Poisoning, by Elliot B. Dewberry (Leonard Hill, Ltd.), is due for publication shortly. This book, of approximately 200 pages, deals with the nature of food poisoning; its history and causation; and the measures necessary for its prevention and control. There is a section dealing with the contamination and decontamination of food by war gases. The price of the book will be 15s.

* * *

Dehydration in New Zealand

Plans for the development of dehydration of foodstuffs on a large scale in New Zealand are expected to follow the visit to America of Mr. A. H. Honeyfield, manager of the Internal Marketing Division at Auckland. There has been some criticism of the Government for delay, in view of the urgent need of conserving shipping space. Progress appears to have been hampered through difficulty in securing machinery. —*Reuter.*

New Maple Syrup Plant

Maple syrup producers of the Province of New Brunswick have discussed a way, it is thought, to overcome the present labour and fuel shortage in the form of a new, modern lightning evaporator to take the place of the old-style equipment used in the production of maple products for the past century.

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U.S. Meat Supplies

Nine men will be in charge of the handling of American meat supplies, it is announced by the War Food Administration and the Office of Price Administration. The names of the nine have not yet been announced, but their job will be to serve as nerve centre for the entire war-time meat management programme. The nine will be known as the meat board, and their headquarters will be at Chicago, Illinois. The members of the board will be mainly civilians, but the U.S. armed forces will have a representative to be named by the Quartermaster-General.

The announcement says: "Quarterly and yearly requirements for meat by the armed forces, civilians, and lend-lease agencies will continue to be determined by the allocation authorities in Washington. The meat board will take steps to make effective the allocation and distribution of the national meat supply among the three claimant groups, taking into account the total quantity of meat available from day to day and week to week.—*Reuter.*

* * *

New Swedish Whaling Company

A shipping company for whaling is being founded at Kungsbacka, West Sweden. This is probably the first company of the kind that has ever existed in Sweden. The name of the new company will be Rederi Aktiebolaget Monaco. At first only one whaling ship will be built, and activity will not begin until after the war. Negotiations are going on with a shipyard for the construction of a suitable whaling ship. A Norwegian whaling expert is among the founders of the company.—*Reuter.*

Paper Saving Forces Concentration Scheme

The necessity to save paper and packaging has dictated the concentration of the Scottish oatcake production industry, the Ministry of Food has told the Scottish Oatcake Manufacturers Association.

When these Scottish producers were advised that their product would be classified as "biscuits" and be subjected to the 50 per cent. cut now applying to the biscuit industry, oatcake makers objected to such classification, and indicated that the plentiful supply of oats made their product a separate section and a national necessity. In refuting this plea, the Ministry of Food has pointed out that the scheme for concentration is as much the result of a scarcity of packaging materials as that of raw materials. The extra care which has to be taken in packing oatcakes and the extra consumption of paper and board was an added reason for this decision. Meantime the Oatcake Makers Association has intimated its intention to fight the concentration proposals to the limit.

* * *

Colonial Food Changes

Britain is not the only part of the Empire where food habits have been vastly changed since the war.

Far more revolutionary alterations are being made in some places, particularly colonial territories where the people have had certain kinds of cereals and pulses as their main foods for many years.

Rice-eating countries, for instance, have had to eke out their supplies since the loss of the Far East. Ceylon is now getting accustomed to wheat cooked in the grain, and Mauritius has learnt to make and cook noodles of wheat flour in place of its usual rice.

In Africa, owing to shipping difficulties, the people have to be supplied with the things that can be got to them most conveniently, and in many cases this means new sorts of basic foodstuffs. In East Africa the people are finding a new composite meal in the markets—a mixture of maize, wheat and manioc. In other places African housewives, accustomed to make their "porridge" from grain, are learning to make do with something completely different—cassava starch or manioc root. In others, colonial officers are helping the food production drive by importing European vegetable seeds that have been especially acclimatised.

In many African communities, because of developments in the stock, dairy farming and hide industries, the people are eating meat for the first time or in greatly increased amounts.

The only new food that has so far proved very unpopular among African people is tapioca!

* * *

Food Education Society

A Conference on "Hospital Catering" will be held under the auspices of the Food Education Society on July 20. It will be opened by Mr. Ernest Brown, Minister of Health.

* * *

CHANGES OF ADDRESS

Brush Electrical Engineering Co

The Manchester branch of the Brush Electrical Engineering Co., Ltd., Petters, Ltd., and Brush Coachwork, Ltd., has been removed from Daimler House, Wilmslow Road, Rusholme, to Yorkshire House, 45, Cross Street, Manchester 2.

* * *

Albert E. Evans

The office of Albert E. Evans and Co., Ltd., has been removed from 8, Wordsworth Parade, Harringay to 14, Hanover Square, London, W. 1. The telephone No. of their factory has been changed to Mountview 9626.

Wheat for Fuel

The Argentine Minister of Agriculture has been authorised to expropriate 130,000 tons of wheat for fuel, stated President Castillo at a press conference following a Cabinet meeting. He is also to ask for tenders for the establishment of a synthetic rubber factory in Argentina.—*Reuter.*

Spillers, Limited

The fifty-sixth annual general meeting of Spillers, Limited, was held recently, the chairman of the company, the Right Hon. Sir Malcolm A. Robertson, P.C., G.C.M.G., K.B.E., M.P., presiding. The Chairman's statement contained the following remarks: I am sorry that the hope which I expressed this time last year, that we should not again have to meet without the directors being able to lay account before you, has not been fulfilled. This arises from the vast amount of detailed accounting work necessitated by the Flour Milling Control Agreement which devolves upon a staff depleted by the demands of national service. Some idea of the work involved will be gained when I tell you that it necessitates the repricing of all inter-departmental transfers of goods back to February 1, 1934, and the segregation from that date of the results of the controlled and non-controlled sections of the company's business. These results have to be computed in accordance with the provisions of the agreement in order to achieve uniformity between one member of the industry and another and all the workings have to be verified by the auditors and afterwards agreed with the officials of the Ministry of Food. Only after all this has been done can the taxation liability be ascertained. The parties concerned outside the company are also seriously affected by the shortage of skilled staff. Considerable progress has been made, and while it is dangerous to make any prophecy, I am hopeful that by the date of the next meeting we shall be able to lay before you a reasonably accurate statement of the results of the first three years' working under the agreement.

The agreement itself has now been extended in substantially the same form for a fourth year. I reserve more detailed comment until I am able to make it in light of the actual results, but such information as we have does not lead the directors to alter the broad view which I indicated to you last year that the terms are not generous having regard to all the circumstances.

Canned Tuna Scheme

Tuna fishing of the Bahamas, sport for rich tourists before the war, will become a business, if a scheme put forward by an American company is sanctioned by the Bahama authorities. The fish will be caught for canning from specially built motor-boats.

* * *

Dr. L. S. Palmer

Professor of agricultural biochemistry at the University of Minnesota, Dr. L. S. Palmer was named Chief in the Division of Agricultural Biochemistry by the Board of Regents of the University on March 1. More than 30 years of research and teaching at the Universities of Missouri and Minnesota have earned for Dr. Palmer world-wide recognition as a biochemist, especially in the field of dairy science. For his work as a pioneer investigator in the chemistry of milk and milk production, Dr. Palmer was singled out in 1939 to be the first recipient of the Borden Award for distinguished service in dairy research. For many years he has been associate editor of the *Journal of Dairy Science*.

While Dr. Palmer's investigations have carried him into many of the broad phases of nutrition and vitamin values, his principal interest has been in such fields as the pigments of milk and butter, cause of butter defects and storage troubles, the physical and colloid chemistry of milk and the churning process. He has carried out extensive research in animal nutrition, with stress on the mineral needs of dairy cattle and the relation of feeding to dairy production and quality.

* * *

Royal Institute of Chemistry

The King has commanded that the Institute of Chemistry shall be known as "The Royal Institute of Chemistry of Great Britain and Ireland".

* * *

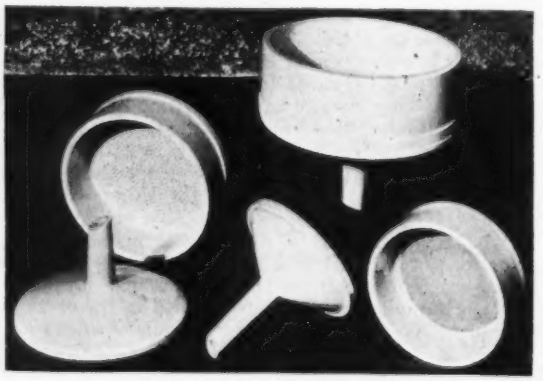
Chemical Stoneware

Chemical stoneware is finding ever-increasing applications in the food industries not only as a wartime alternative for metals and other materials now in short supply, but also entirely on its own merits for many processes where no other material can show the same excellent all-round resistance to chemical attack.

Among new designs recently put on the market by Doulton and Co., Limited, the following are of particular interest to food manufacturers:

White stoneware Buchner funnels are made in a special porcellanous stoneware body which permits a much more robust form of construction than ordinary porcelain funnels. They are supplied with standard Buchner tops, incorporating either the usual perforated base or a porous ceramic base, which replaces the customary filter paper. The latter type (which is covered by patent) is particularly useful where large quantities of the same type of liquor have to be handled.

An entirely new design of vacuum filter is now available, incorporating a porous ceramic filtering surface, made and fired integrally with a non-porcelain surround. The centre portion of the plate thus forms the filter medium and the outer portion is ground and polished to give a vacuum-tight joint with the filter body. The filter plates are interchangeable and are made in different porosities, so that a single filtering unit can be used for a variety of products. For ordinary continuous use a perforated plate can be supplied as an alternative to the porous plate.



Information and Advice

Canning of Pork

8,591. *Required, information on the canning of pork.* (London.)

This general question involves the whole subject of meat canning, but the following details may be helpful. Pork may be canned in many forms, among these being ham, half ham, quarter ham, devilled ham, potted ham, spiced ham, luncheon roll, roast pork, corned pork, pork sausages, pig's tongue, etc.

In canning hams, they are first sorted as to size and quality and then trimmed to remove excess fat and skin. This operation permits giving them the general shape of the can to be used. After a short stay in the cold storage room the hams are salted either dry or by immersing them in brine to which a small quantity of sugar has been added. The length of time the hams remain in the brine varies a good deal according to size, quality and manufacture, but when the salting is completed the hams are dried slightly and placed in the smoke room. The smoked hams are then boned and fitted into the cans, which are sealed, exhausted by vacuum, and the cans processed. Three sizes are most usual : whole ham, half hams and quarter hams.

There is a multiplicity of recipes for ham pastes, usually associated with tongue and sometimes chicken. In FOOD MANUFACTURE, XV, **7**, 172-175, will be found an article by T. Crosbie-Walsh on a modern meat factory, in which is given a description of the processes involved.

The materials used are boiled bacon, cooked tongue, seasoning, with a certain proportion of filler.

Sausages for canning are made in the usual way. For a wartime sausage the following recipe was given in FOOD MANUFACTURE, XV, **7**, 176 :

GRADE A PORK SAUSAGE.

	Per cent.
Lean meat	48
Fat	24
Binder	26
Seasoning	about 2

Seasoning.	*Parts.*
Salt	16
Ground white pepper	4
Ground mace	2
Ground ginger	2
Ground sage	1

Meat should be prepared, all skins and gristle removed. Break down the lean meat on mincer, break down fat, put the meat in bowl chopper followed by seasonings, soaked binder and, finally, fat. Chop fairly finely, fill into casings and link as desired.

A recipe for canned roast pork runs as follows : Place the pork (pork shoulders give a fine roast) on roasting pans which have been previously greased with lard and pour a little water to cover the bottom of the pan. The pan is placed in a hot oven allowing the meat to take colour. When cooked enough, the meat is cut into pieces, of proper size to fill the cans, and covered with jelly. A little flavouring by spices is an advantage.

The cans, after exhausting and sealing, are sterilised, the time depending on the size of the cans.

Pork and beans are prepared as follows : Pick over haricot beans, wash and soak in a cool place for about 16 hours. Drain. Prepare liquid to cover the beans, using the proportion of 1 quart of water, 1 tablespoonful of salt and 1 tablespoonful of sugar to each pound of dry beans. Or prepare an equal quantity of tomato sauce, using 3 parts of tomato pulp to 1 part of water. Add ground spices, cayenne pepper, and chopped garlic or onion, as desired. Cook till thick.

Blanch the beans for 2 minutes in boiling water and drain. Place small pieces of salt pork in a container for baking. Add the beans and additional pieces of salt pork and cover with the prepared beans in a slow oven (about 250° F.) for 1½ hours. Remove the lid and cook ½-hour longer. Pack hot in the cans and cover with the liquid or sauce.

Thiourea

8,727. *Required, full information regarding the use of thiourea as a preservative agent for fruit and vegetables, and any information as to the preserving potentialities of this chemical, whether it is in any way injurious to the public health, whether it is permitted by law to be used, and, if so, in what proportion.* (London.)

The following is a list of some references to the literature that we have been able to find. They are all contained in the *Contributions of the Boyce Thompson Institute*, published in the U.S.A. :

F. E. Denny, Vol. 7, 1935, 55-61; Vol. 13, 1942, 309-320.

The foregoing relate to the actual use of the substances for the preservation of food, and deal with its effects in countering browning in solid foods, apple juice, etc. Studies of the toxicity, as follows, have shown the material to be harmless in any dose likely to be practically used :

A. Hartzell, Vol. 11, 1940, 249-260; Vol. 12, 1942, 471-480. F. B. Flinn, Vol. 11, 1940, 241-247.

We have not heard of any work on the subject being done in this country.

Information Supplied

8,682. *Suppliers of carrot syrup.* (London.)

8,692. *Suppliers of meat flavour.* (Dublin.)

8,700. *Manufacturers of a slicing or shredding machine, preferably hand-operated, suitable for shredding cabbage to be made into sauerkraut on a small commercial scale. Many enquiries have been made with a view to obtaining such a machine but have been unsuccessful. At present a small slaw-cutter is being used, but a machine is required which can deal quickly with a fairly large number of cabbages. It is believed that the machine specially manufactured for this purpose consists of a cylinder, the bottom of which rotates and is formed by a series of knives; the cabbages are fed into the top of the cylinder and the shreds fall out at the bottom.* (Lancs.)

Information Required

8,715. *Manufacturers of rubber paste.* (London.)

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Improvements in or relating to the Manufacture of Coffee Essence and the like

This invention consists of improvements in or relating to the manufacture of coffee essence and particularly to modifications in the process of manufacturing essences. The expression coffee essence includes extracts or essences prepared from coffee, chicory or other vegetable substances, for example, acorns or beech nuts, which may be used in a roasted form as substitutes for chicory when mixed with coffee.

In the normal production of coffee essences the coffee beans and chicory roots are roasted and crushed and subjected to extraction or infusion with either steam or water after which the resulting distillate, extract or infusion is subjected to processes of concentration generally by means of evaporation under a vacuum at a suitable degree of heat. It is in fact necessary to bring the extract to a high degree of density to avoid biological changes and in particular to prevent the growth of any mould without the use of chemical preservatives.

Coffee essences prepared according to methods generally known and approved sometimes have a crude and harsh taste when freshly prepared, but ageing processes are not normally used.

In the case of coffee essence a harsh crude taste can be overcome or minimised by a process of oxidation and particularly by treating the essence in the course of manufacture with an oxidising agent such, for example, as hydrogen peroxide or nascent oxygen. It is important that the oxidising agent should leave behind no substance which could be injurious to the coffee essence; indeed it is desirable that the oxidising agent should leave behind no constituent which is not natural to the coffee essence itself and for this reason hydrogen peroxide or nascent oxygen (or ozone) are the preferred oxidising agents. Any such oxidised agent must of course be free from any harmful impurity.

It is also desirable that the density of the extract or essence should not be substantially modified and therefore in the case of hydrogen peroxide it is preferred to treat the coffee essence with concentrated H_2O_2.

In the production of coffee essence it is customary to lead the condensed product from the last stage of evaporation through a pipe or like conduit to a bottling machine and in the preferred process according to this invention concentrated H_2O_2 is introduced drop by drop into the stream of coffee essence before it reaches the bottling machine and at the point where the addition is made it is convenient to subject the essence to gentle turbulence to ensure adequate mixing of the oxidising agent with the essence.

If the oxidising agent is in a gaseous form such as oxygen, nascent oxygen or ozone, the bubbles of gas may be passed through the essence which would again be conveniently subjected to turbulence. The temperature at which the oxidising agent is applied to the essence is a factor in the "maturing" process and best results have been obtained by adding H_2O_2 in the manner above described to the still warm essence from the last stage of evaporation.

548,889. Dr. Werner Arndt and Saml. Hanson and Son, Limited.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

549,742. LEWIS, C. H.: Machines for plucking hops and other plants.
549,777. BECKETT, LAYCOCK AND WATKINSON, LTD., WATKINSON, A., PERNETTA, C., and BARRATT, C. B.: Sliding windows.
549,784. BRITISH THOMSON-HOUSTON CO., LTD.: Refrigerating apparatus.
549,794. KLEEN, N. E. AF.: Absorption refrigerating apparatus.
549,801. SCHAUL, M. A., and DEUTSCH, B.: Food preparation and process for the production thereof.
549,803. RADO, L.: Process and apparatus for sealing packages.
549,821. MEURK, B. E., and NOLAND, B. H.: Steam plant installation and operating procedure for distilling water.
549,851. MILLICAN, T., BANNISTER, H. W., and LIVERPOOL BORAX CO., LTD.: Softening or purification of water.
549,854. HARBER, L. S., POINTON, J. E., and BAKER PERKINS, LTD.: Manufacture of bread.
549,883. BARON, P. H.: Containers for liquids.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

SOREEN.—619,244. Yeast, yeast extract for food, bread improvers, icing sugar, spices, cooking essences (not being essential oils), flavourings (not being essential oils), marzipan paste, macaroon paste and fondant paste. **Sorensen Bakery Equipment, Limited,** Drake Street, Stretford Road, Manchester; Engineers and Manufacturers. To be associated with No. 619,243 (3386) xxix and another.

SOUPETTA.—B620,035. Preparations of cereals with or without dehydrated vegetables for use in soups, stews and similar dishes. **Lloyd Rakusen and Sons, Limited,** 20, Meanwood Road, Leeds, 7, Yorkshire; Manufacturers.

LUCULLUS.—621,080. Dried herbs for food or for use as ingredients in food. **Helen Lucas and John Landfear Holt Lucas,** trading as **R. Brooks and Co.,** 27, Maiden Lane, Covent Garden, London, W.C. 2; Merchants and Manufacturers.

New Companies

Barnby and Ward, Limited. (377677.) 57, George Street, Altrincham, Ches. To take over the bus. of confectioners and pastrycooks cd. on as "Barnby and Ward" at Altrincham. Nom. cap.: £1,000 in £1 shares. Dirs.: Alice E. Worthington, 6, Glen Rise, Timperley, Ches.; Mabel L. Brady, 5, Cleveland Road, Hale, Ches.; J. Worthington, 137, Stockport Road, Timperley, Ches.

C. Cain and Son, Limited. (377679.) 48, Bridge Road, Litherland, Lancs. To take over the bus. of a butcher cd. on at Litherland by Christopher T. Cain. Nom. cap.: £1,000 in £1 shares. Dirs.: C. T. Cain and Mrs. M. Cain, both of 48, Bridge Road, Litherland, Lancs.

Kerwood and Company, Limited. (377685.) To carry on bus. of manufacturers and dlrs. in glass, china, pottery, bottles, etc. Nom. cap.: £500 in 100 fndrs. and 9,900 ord. shs. of 1s. Dirs.: Not named. Subs.: Sylvia Lehmann, 56, Woodland Gardens, Muswell Hill, N. (secy.); A. F. W. Lickfield, 31, Rhodesia Road, S.W. 9 (clk.).

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.